JIYI K++ V2

Flight Control Manual

V1.0.1

9/7/2020

Thank you in advance for purchasing this product! Please install this product on your aircraft in strict accordance with the requirements of the instruction manual. I wish you a happy use.

Note:

1. This manual needs to be used in conjunction with the corresponding assistant software. If there is any discrepancy with the assistant software, please refer to the assistant software.

2. This product is forbidden to be hot swapped (that is, the plug of the module cannot be plugged or unplugged while power is on).

3. During the process of upgrading the flight control firmware, it is strictly forbidden to unplug the parameter adjustment cable halfway (during the flight control firmware upgrade process, do not supply power to the flight control again).

If you encounter problems that cannot be solved during use, please contact Jiyi Robotics (Shanghai) Co., Ltd. technical support or after-sales personnel.

Disclaimer

Warm reminder: Jiyi K ++ V2 flight controller is not a toy, please read this statement carefully before using it, it means that you acknowledge and accept this statement, this product is not suitable for users under 18 years old.

This product is a professional-grade flight control developed by Jiyi and developed for industry applications. It meets the needs of users such as plant protection, mapping, aerial photography, etc. Jiyi integrates the pursuit of high-quality products into the development of this flight control to make it more stable and reliable, but for the safety of you and others, it is strongly recommended that you remove the propeller when using the assistant software, and during the flight experience Make sure the wiring is correct, the power supply is normal, and it is away from the crowd, vulnerable and dangerous goods. When you use this product, due to any of the following reasons (including but not limited to the following reasons), you and others' property damage or personal injury (including direct or indirect), Jiyi will only assume the flight control loss caused by the problem 2, will not be liable for any other liabilities and compensation:

1. The user did not follow the correct guidance of this manual when using it;

2. The strength of the aircraft itself is too low and the structure is damaged;

3. Problems with the third-party products used by the user caused poor aircraft operation;

4. User's subjective judgment error or improper manipulation;

5. The user intentionally targets others;

6. The user still ventures to fly when he knows that this product is in an abnormal working state;

7. The user is flying in a situation where strong magnetic interference, radio interference and areas prohibited by the government or the line of sight are blocked and the attitude of the aircraft cannot be determined;

8. The user flies in bad weather conditions that are not suitable for flight;

9. The user disassembles and modifies the products and accessories produced by Jiyi Company without permission, which causes the aircraft to malfunction.

10. The user flies under the condition of objective factors such as poor mental state caused by subjective behaviors such as drinking and drug use, or problems with his own health;

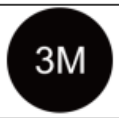
11. The loss caused by other non-polar wing products is not within the scope of wing's liability.

Table of Contents

Product List

1. Standard list

Before using this product, please carefully check whether the following items are contained in the product package. If it is missing, please contact us.

Illustration	Name	Number
	FC	1
	PMU	1
	GPS	1
	LED	1
	Double-sided tape	3
	Three Guarantees	1
	GPS Bracket	1
	USB	1
	DuPont line	2

2. Matching list

Illustration	Name	Number
	IOT	1
	Obstacle avoidance radar	1
	Anti-Ground Radar	1
	RTK	1
	remote control	1

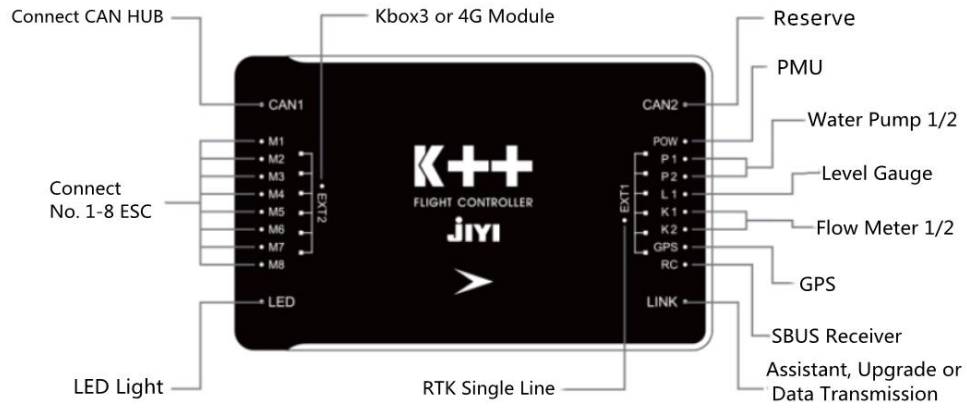
Flight controller kit basic parameters

Basic Parameters

Supported models	I4、X4Four-rotor IY6、Y6、I6、V6 Six-rotor V8、I8、X8、IX8 Eight-rotor	
Recommended battery type	3S-12S lithium polymer battery	
External receiver type	SBUS receiver	
Support JIYI products	K-BOX, IOT, RTK, binocular obstacle avoidance, ground imitation radar Integrated remote control, FPV camera, flow meter, liquid level meter	
Assistant software system configuration requirements	Windows 7 /8 /10 (32 或 64 位)	
Hovering accuracy	horizontal direction : ±1.5m Vertical direction : ±0.5m	
Maximum tilt angle	30°	
Maximum yaw speed	150°/s	
Maximum vertical speed	6m/s	
Maximum wind resistance	wind : 4级 gust : 5级	
Power consumption	< 5W	
Working voltage range	FC	4.8V-5.3V
	PMU	Input 11.1V-50V (3S-12SLiPo recommended) Maximum output current 3A@5V
	PMU2 (UPS)	Input 11.1V-50V (3S-12SLiPo recommended) Maximum output current 3A@5V
	GPS	5V
	LED	5V
	Voltage	3S-12S
Working temperature	-10℃ ~ 60℃	
Storage temperature	-25℃~60℃	
colour	black	
weight	Total net weight : 321gFC : 87g PMU : 41g PMU2 (UPS) : 44g GPS : 45g LED : 14g	
size	FC : 72.6*48*22.8mm PMU : 53.4*34.4**14.5mm PMU2 (UPS) : 53.4*34.4**14.5mm GPS : φ62*14.3mm LED:24*24*8mm	
Weight of the whole box	803g	
Box size	256*176*55mm	

K ++ V2 main control installation

1. K ++ V2 FC diagram



2. K ++ V2 installation location requirements

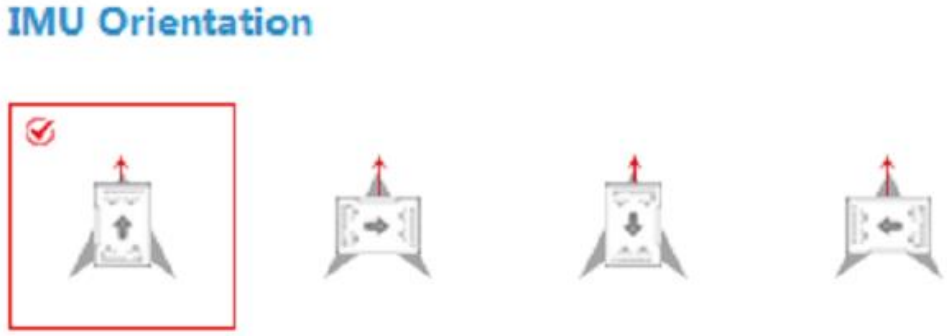
1). It needs to face up, not upside down, and try to keep it parallel to the fuselage;

2). In order to obtain the best flight effect, it is recommended to install the flight control level at the center of gravity of the aircraft. If the flight control installation position is not at the center of gravity of the aircraft, please fill in the corresponding installation distance in the Basic-> Installation-> Installation Position interface in the K ++ Assistant Software;

3). The flight controller has done a good job of internal shock absorption, and try to use hard 3M glue to fix the flight controller.

3. K ++ V2installation orientation requirements

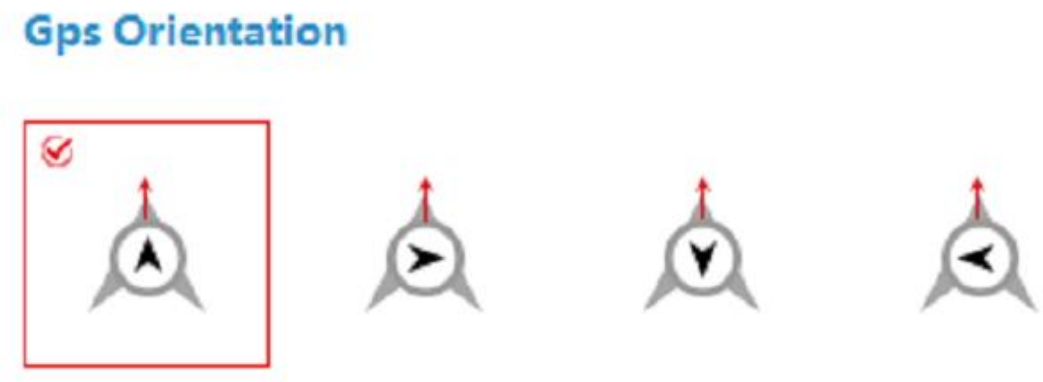
As shown in the figure, select one of the installation directions, and select the corresponding configuration in the Basic-> Installation-> IMU Direction interface in the K++ V2 Assistant Software. (The direction of the red arrow represents the head direction)



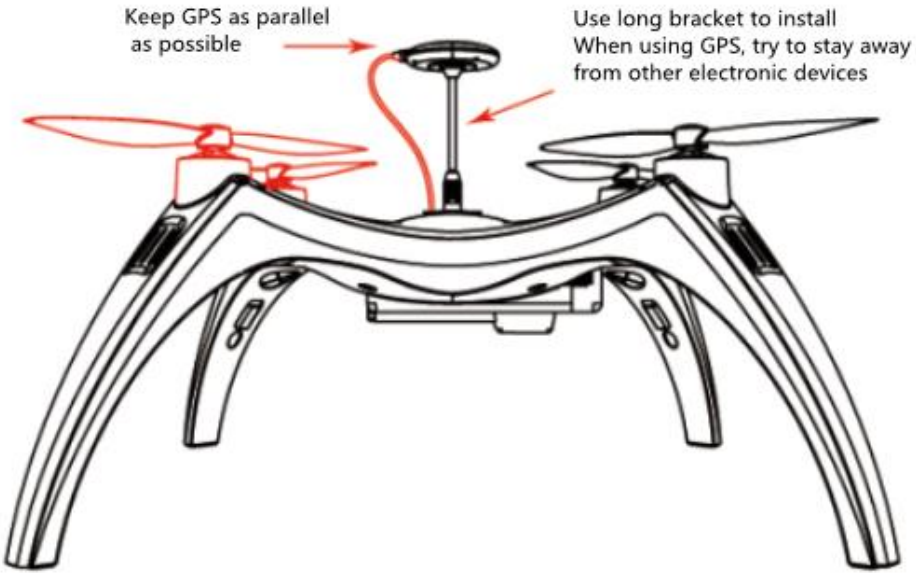
GPS module installation

1. Requirements for installation direction

As shown in the figure, select one of the installation directions, and select the corresponding configuration in the Basic-> Installation-> GPS Direction interface in the K ++ Assistant Software. (The direction of the red arrow represents the head direction)



2. Installation location requirements



1). Elevate the GPS module as far as possible, and keep away from ESC, power wires, and motors;

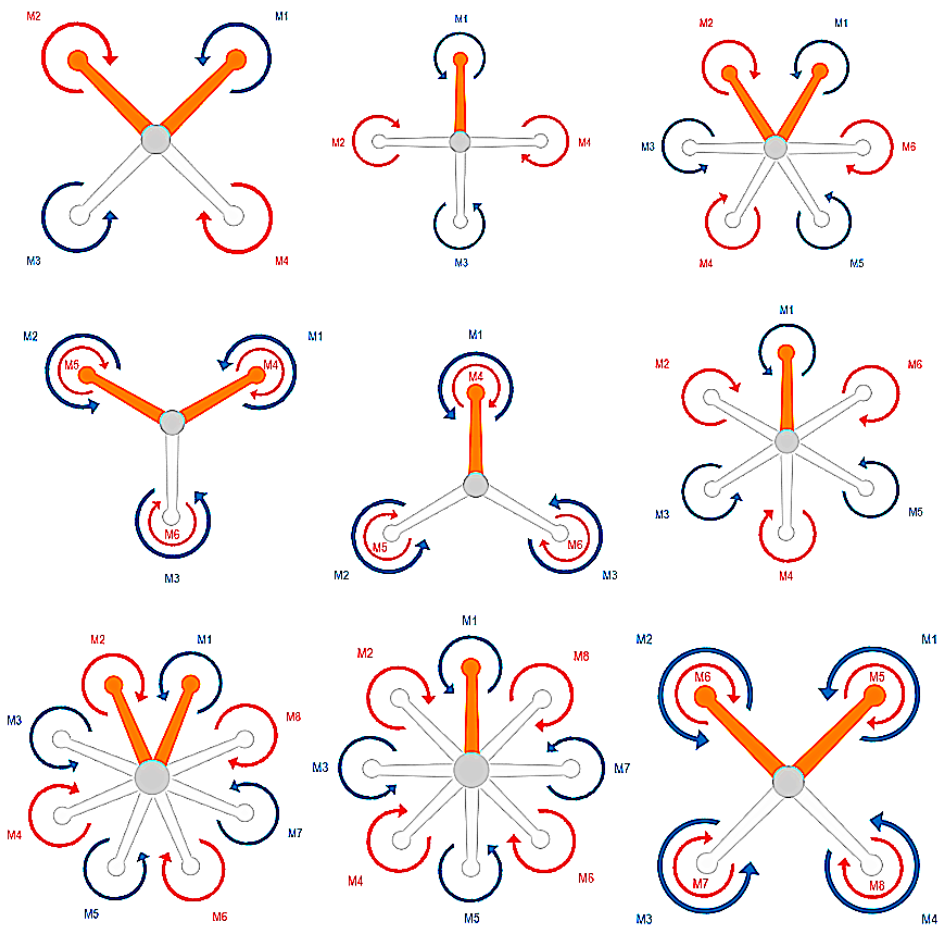
2). Try to ensure flight in an open and unobstructed environment;

3). Try to avoid flying in a magnetic interference environment;

4). Do not place strong magnetic substances near the compass, otherwise permanent damage to the compass may be caused。

Rack type

The rack types supported by K++ are as follows:



Illustrate:

(1) The direction of the yellow arm in the picture is the direction of the nose.

(2) The numbers marked in the figure correspond to the flight control input ports M1 to M8.

(3) Coaxial multi-rotor structure, blue indicates the upper propeller, and orange indicates the lower propeller.

Software debugging

Jiyi K ++ V2 Flight Controller Assistant Software is a software specially developed for K ++ V2. Users can connect the flight controller and the computer's USB port through a dedicated USB parameter adjustment cable. It provides flight control and aircraft related components (such as racks, remote controls, Expansion module, etc.) to view, set and upgrade flight control firmware, download flight logs, etc.

Assistant software download

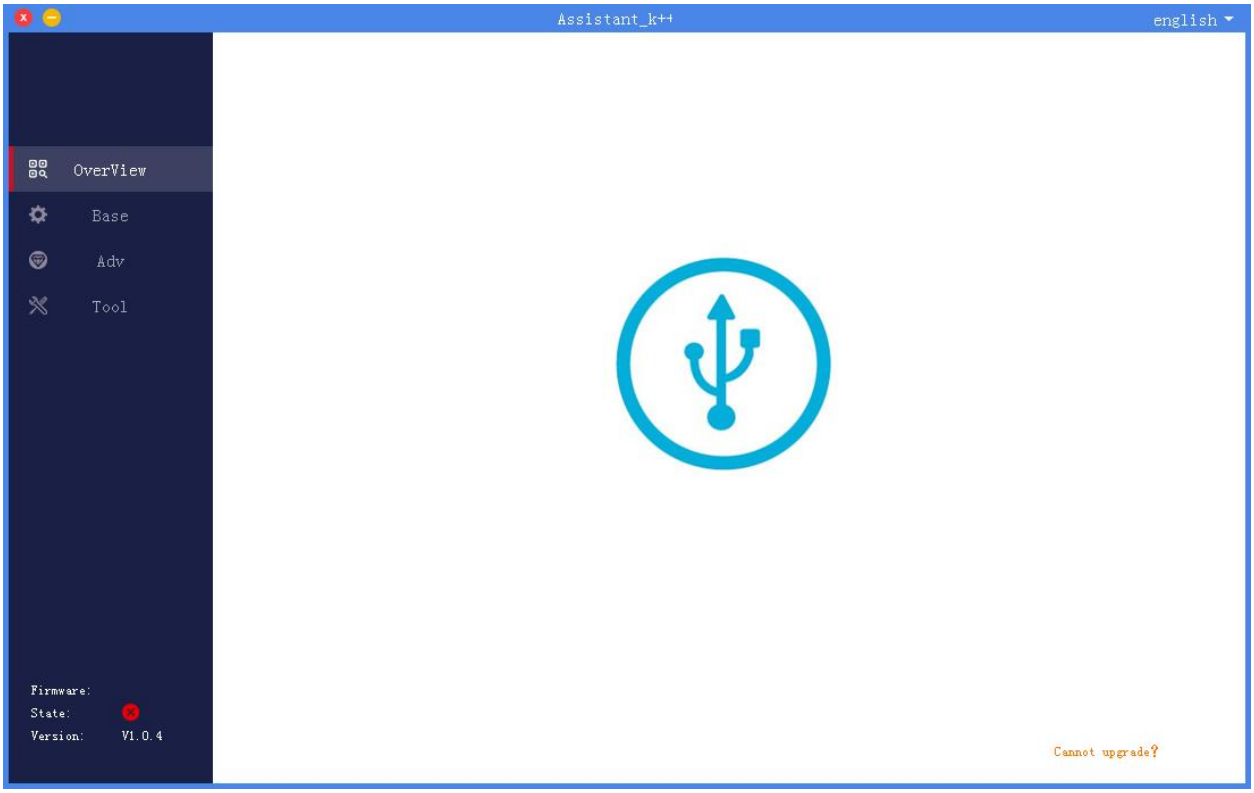
Before using this product, you need to download and install Jiyi K ++ V2 Flight Controller Assistant Software .

http://www.jiyiuav.com/download.html

Note: Jiyi K ++ V2Flight Control Assistant Software supports computers with Windows versions above Win7 , and does not support mobile phone installation.

Connect Assistant Software

After downloading the software to the computer, open the Gyroscope K ++ V2 flight control software exe file, and then connect the flight control to the computer through a dedicated USB cable. As shown in the figure, click the USB connection icon in the middle of the interface to use it normally.

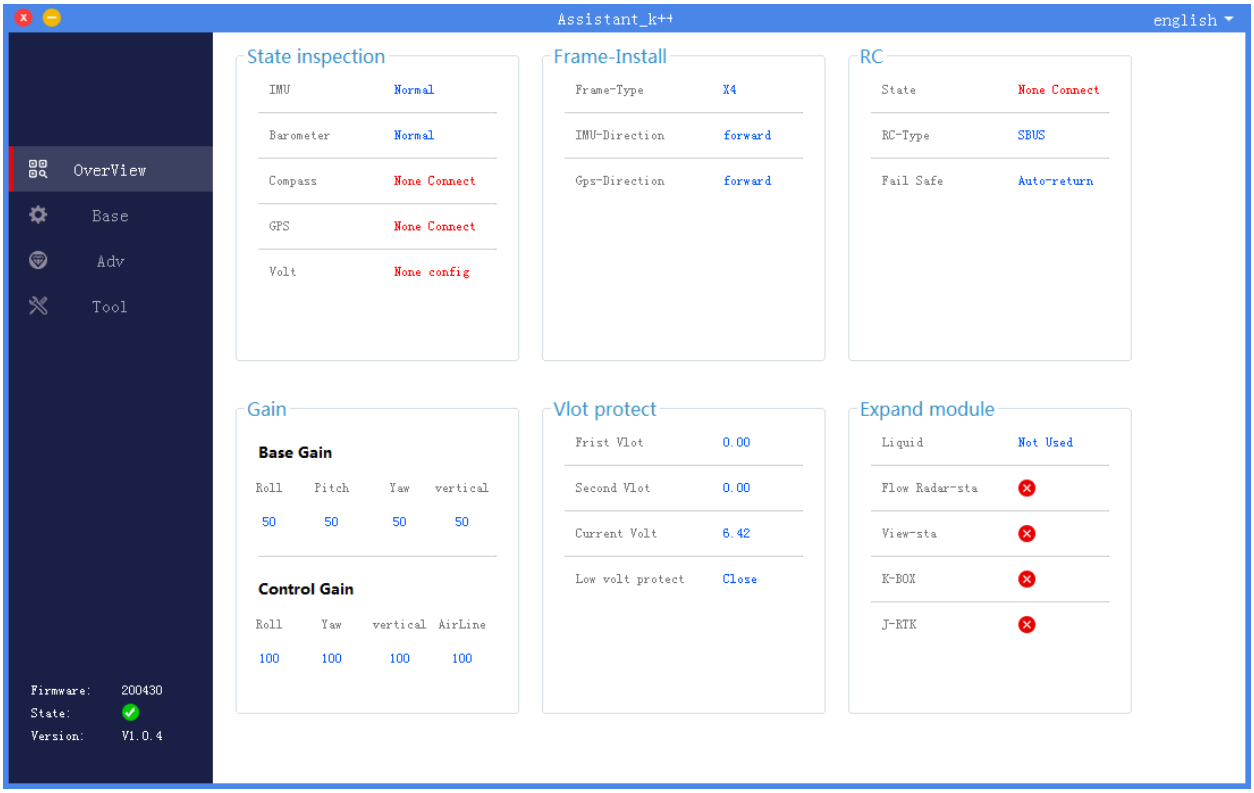


Assistant Software Introduction

Jiyi K ++ V2 flight control software includes four functional interfaces: viewing, basic, advanced and tools.

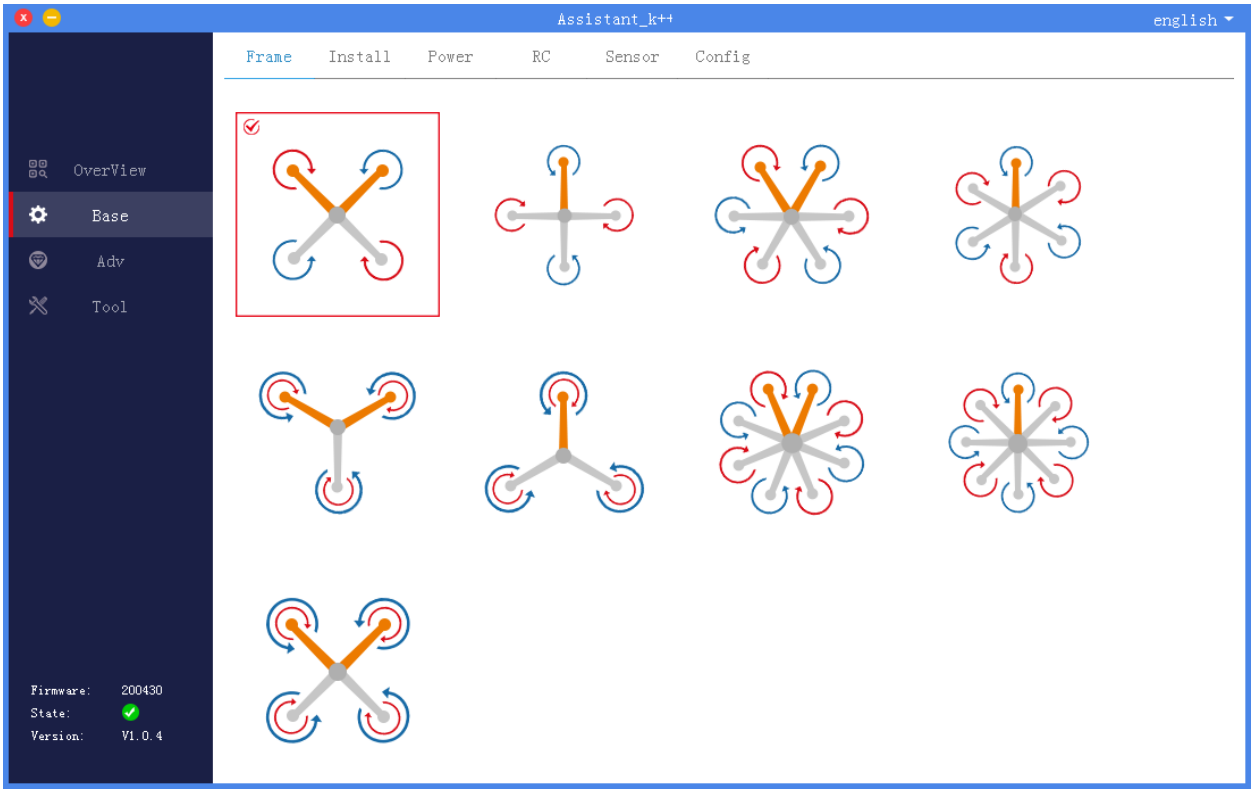
1. View interface

The viewing interface is mainly used for reading and viewing parameters. It can detect the basic parameters of the flight control, the installation data of the rack, the main parameters of the remote control, the aircraft's sensitivity, the battery voltage protection setting parameters, and the connection of the expansion module Status or parameter.



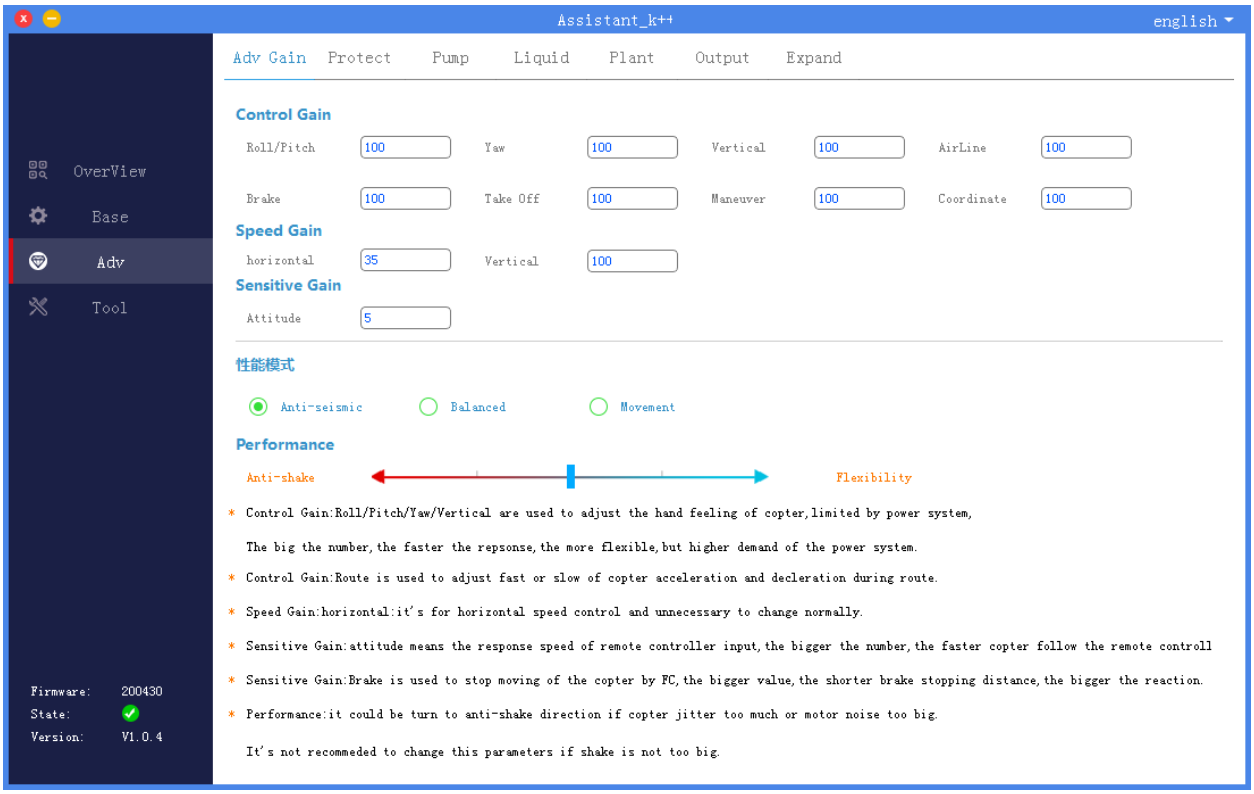
2. Basic interface

Basic interface, including rack selection, installation direction selection, power configuration settings, remote controller parameter settings, sensor data reading and calibration, and flight parameter setting functions.



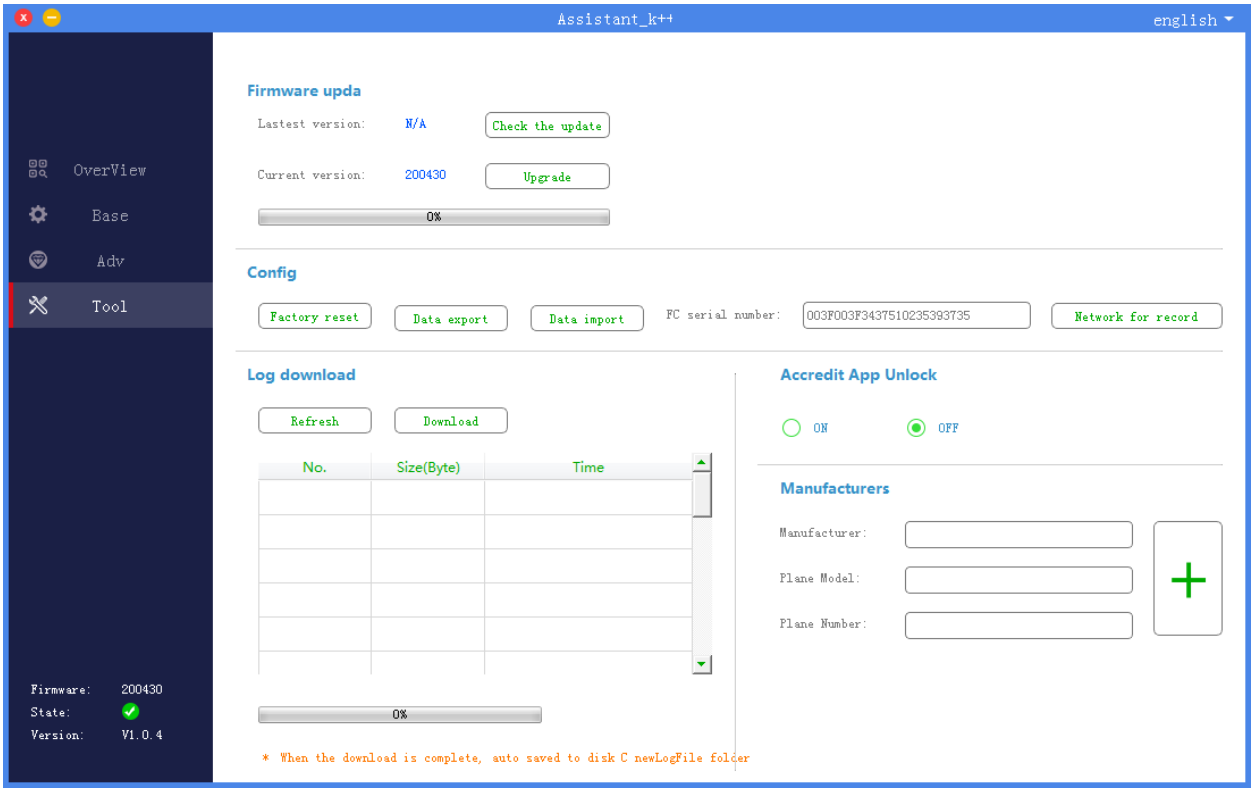
3. Advanced function interface

The advanced function interface includes advanced sensitivity, protection functions, pump settings, level gauges, plant protection functions, fence modules and expansion modules.



4. Tool interface

The tool interface mainly includes the functions of upgrading flight control firmware, restoring factory settings, importing and exporting flight control parameters, downloading flight logs, and registering flight control manufacturers and aircraft models. After filling in the aircraft and manufacturer information, you need to click the green + mark on the right to complete.

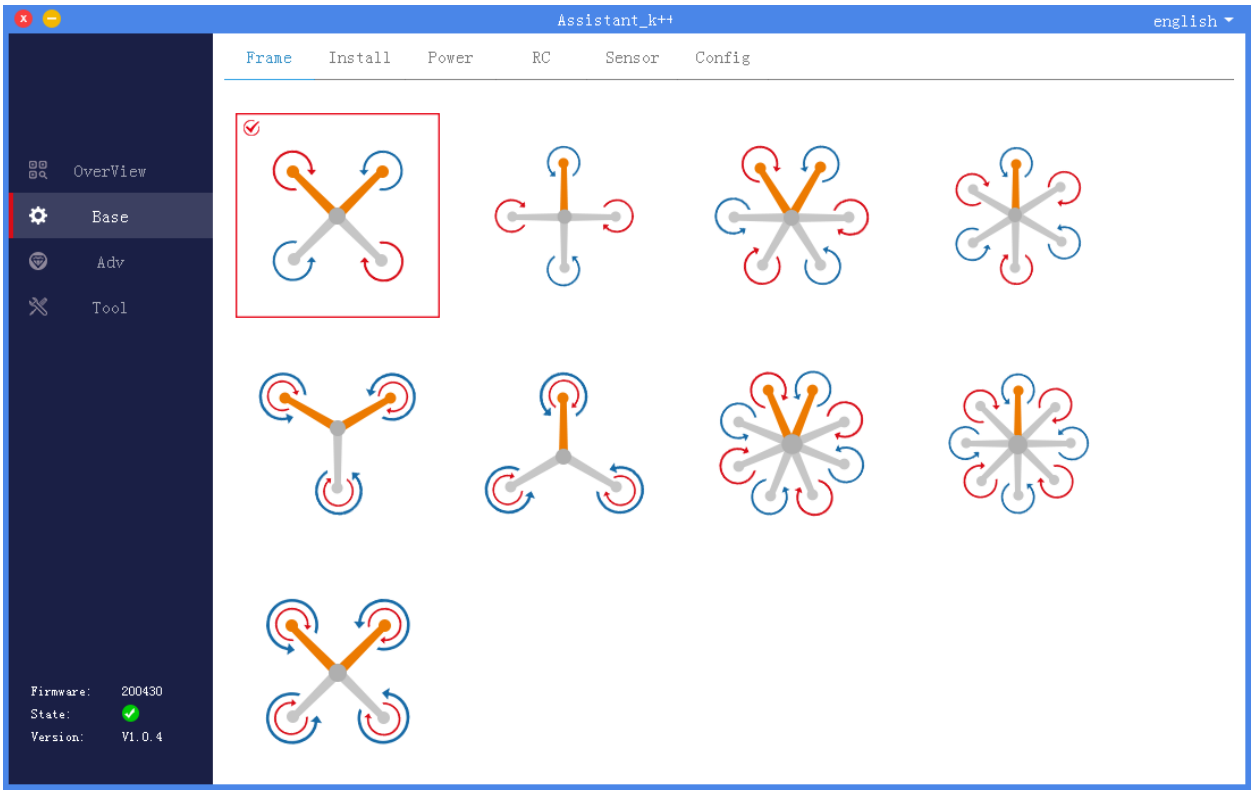


Basic function settings

The flight controller is installed on the aircraft for the first time, and you can use the assistant software to perform the following basic function setting steps before normal flight.

1. Rack selection

Click to enter the basic interface of the assistant software, select the rack in the upper menu bar, as shown in the figure, and select the correct rack according to the actual flight control aircraft. The direction of the yellow arm in the picture is the head direction.



2. Installation settings

Click to enter the basic interface of the assistant software, select installation from the upper menu bar, as shown in the figure, choose the correct orientation according to the actual installation direction of the flight controller and GPS.

1) .IMU orientation

The direction of the IMU is the installation direction of the flight controller. The red arrow facing the IMU indicates the nose direction, and the gray arrow on the flight controller indicates the direction of the flight controller. The wrong choice can lead to serious flight accidents.

2) .GPS orientation

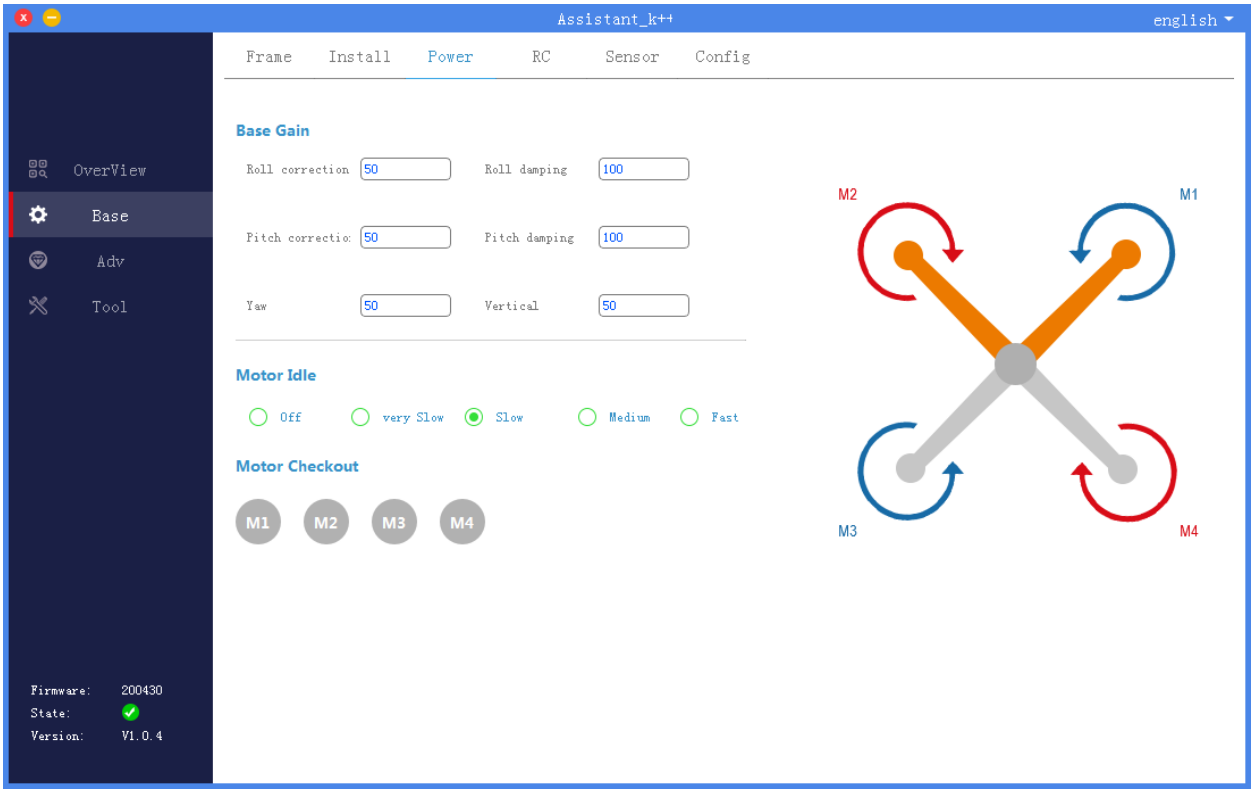
The red arrow of the GPS direction indicates the nose direction, and the black arrow of the GPS direction indicates the GPS direction. Please ensure that the set GPS direction is consistent with the actual GPS installation direction. If using dual GPS modules, please ensure that the two GPS installation directions are the same. The wrong choice can lead to serious flight accidents.

3) .IMU location

For users with high requirements for flight performance, ordinary users can leave it alone. According to the distance between the flight controller and the center of gravity of the aircraft, fill in the IMU installation position correctly.

3. Power configuration

Click to enter the basic interface of the assistant software, select the power configuration in the upper menu bar, as shown in the figure, including basic sensitivity settings, motor idle speed selection, motor sequence detection and motor serial number.



1). Basic sensitivity setting

Basic sensitivity includes roll correction, roll damping, pitch correction, pitch damping, yaw, and vertical. It is mainly used to adjust and adapt to the rack. The function definition of each sensitivity is shown in the table.

Roll/pitch correction	It is used to adjust the attitude control adapted to the aircraft. It is the correction force for centering and stick control. If the aircraft attitude is weak and weak, it should be increased; if the movement is stiff and exaggerated, it should be adjusted down.
Roll/pitch damping	used to adjust the attitude control of the aircraft to resist external disturbances. If the aircraft attitude is high-frequency jitter, it should be adjusted down; if the movement is stiff and there are many small movements, it should be adjusted up.
Yaw	It is used to adjust the yaw control of the adapted aircraft. If the aircraft lock cannot be locked, the sensitivity should be increased.
Vertical	It is used to adjust the height control of the adapted aircraft. If the aircraft twitches back and forth, the sensitivity should be reduced.

Basic sensitivity debugging steps:

a. First adjust the vertical sensitivity, adjust it under no-load conditions, and slowly increase the vertical sensitivity until the aircraft twitches up and down, and then adjust the sensitivity back to no twitch.

b. Adjust the roll / pitch damping sensitivity again, and slowly adjust it from low to high according to 10%, until the aircraft appears high frequency jitter or the motor noise increases significantly, then fine-tune the sensitivity back to normal conditions.

c. Then adjust the roll / pitch correction sensitivity, press 10% slowly from low to high, until the aircraft shakes, the motor sound is abnormal or exaggerated, and then adjust the sensitivity back to normal conditions.

d. Finally adjust the yaw sensitivity. In general, if the default parameters do not appear to lock the head, you do not need to adjust it. If the head does not lock, increase the sensitivity.

2). Motor idle speed selection

It is used to set the idle speed of the motor after the aircraft is unlocked. Disabled means not to rotate. From very slow to fast, it means that the speed that can be reached by clicking is faster.

3). Motor sequence detection

Used to test the rotation direction of the motor. When using this function, connect the power battery and remove the propeller.

～ M4, the corresponding motor will rotate at idle speed. Please ensure that the motor serial numbAfter clicking the circular buttons M1 ～ M4, the corresponding motor will rotate at idle speed. Please ensure that the motor serial number, steering and diagram are consistent.

4 Remote control settings

Click to enter the basic interface of the assistant software, and select the remote control in the upper menu bar. As shown in the figure, you can select the remote control type, remote control flight mode channel settings, and runaway protection settings according to actual requirements.

1) .Remote control type

K ++ V2flight control currently supports SBUS type remote control.

2) .Remote control calibration

Note: The remote control must be calibrated when using or replacing the remote control for the first time.

Click the "Joystick Calibration" button to start the joystick calibration. Turn on the remote control at the same time, and move all the joysticks of the remote control back and forth between the maximum and minimum positions, and confirm that channels 1 to 4 of the remote control are roll, pitch, throttle, and yaw respectively. After calibration, return 1 ~ 4 channels of the remote control to the middle position, and then click the "Calibration End" button.

3) .Flight mode setting

The 5 channels of the remote control are used to map the flight mode. Three flight modes can be set in the K ++ V2assistant software: ATT (attitude mode), manual operation (GPS mode), and AB execution (AB operation mode). Subsequent chapters will explain each flight mode in detail. By default, the three positions of the 5 channels are all ATT mode. The user can click the drop-down menu to the right of the three positions to select another mode.

4). Runaway protection settings

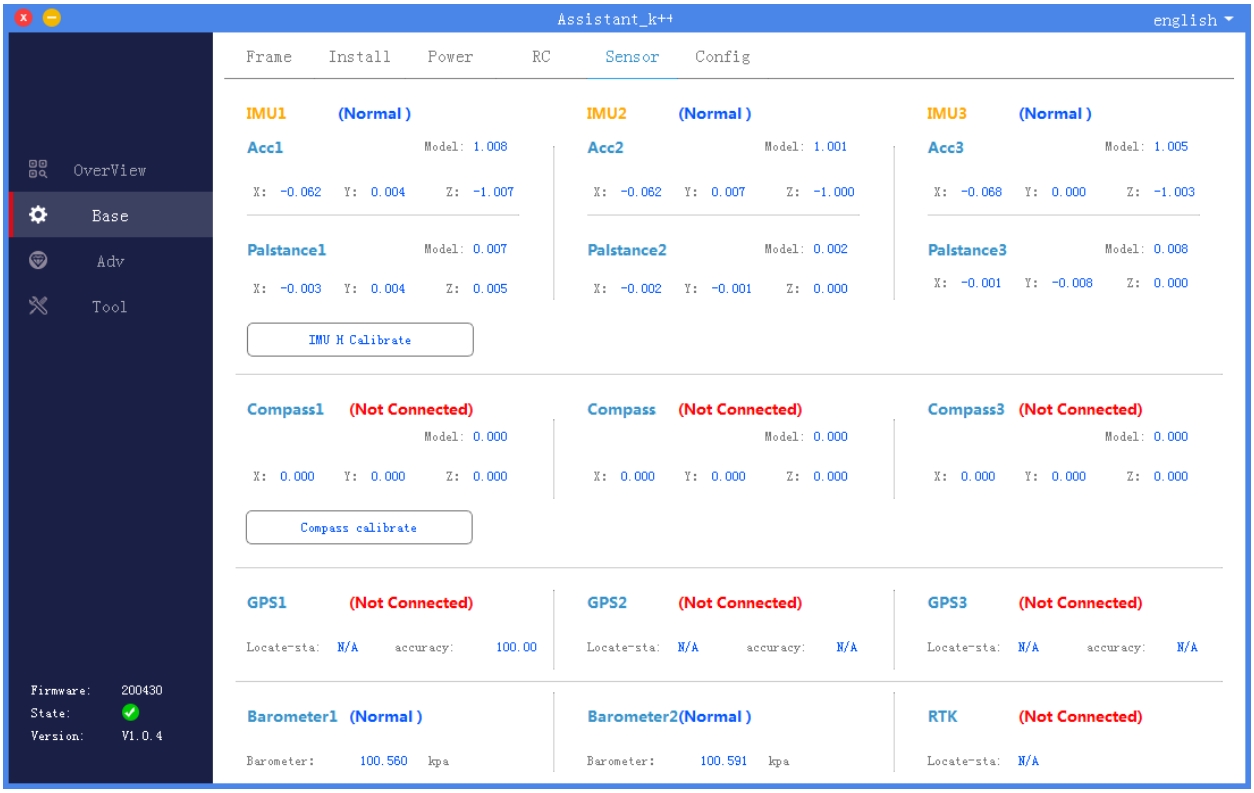
Runaway protection is used to set the flight behavior of the remote control when it is out of control, including automatic return, automatic landing, automatic hovering and landing after hovering.

5). Run out of control to continue route setting

When the out-of-control continue operation option is enabled, the out-of-control protection will not be performed after the remote control is out of control in the operation mode (AB operation, route operation), but the operation task will continue to be performed. It is recommended to use this function with the radar.

5.Sensor

Click to enter the basic interface of the assistant software, select the sensor in the upper menu bar, as shown in the figure, check the flight control IMU and GPS sensor parameters, and perform accelerometer calibration and magnetic compass calibration. When you click calibration, the assistant software will prompt Instructions, just follow the interface instructions.

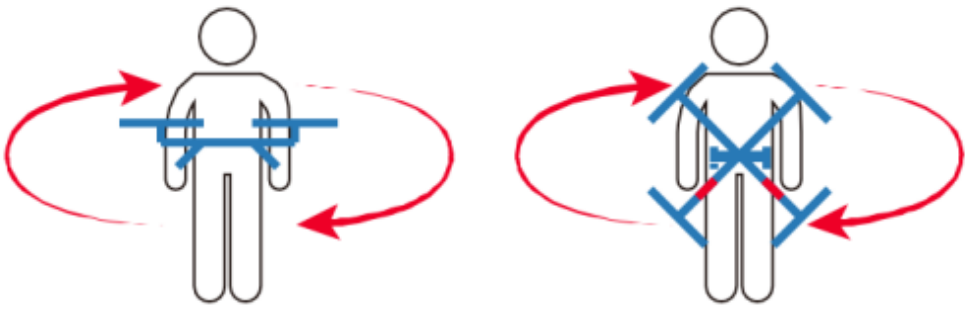


1) .IMU calibration

Place the plane horizontally and click the “IMU Horizontal Calibration” button. Calibration will be completed after 3 seconds. If the body is placed at an inclined angle during calibration, or if it is shaken, it needs to be recalibrated.

2). Magnetic compass calibration

Click the “Magnetic Compass Calibration” button, the LED yellow light is always on, and enter the horizontal calibration. As shown in the figure, at this time, place the aircraft horizontally, rotate the nose clockwise until the LED green light is always on, and enter vertical calibration. As shown in the figure, at this time, the nose is facing downwards and rotated clockwise until the LED red, green and yellow flash alternately, and the calibration is completed.



Precautions:

a. When the flying field changes, the magnetic compass needs to be recalibrated.

b. Before calibration, please check if there is strong magnetic interference nearby.

6. Flight parameters

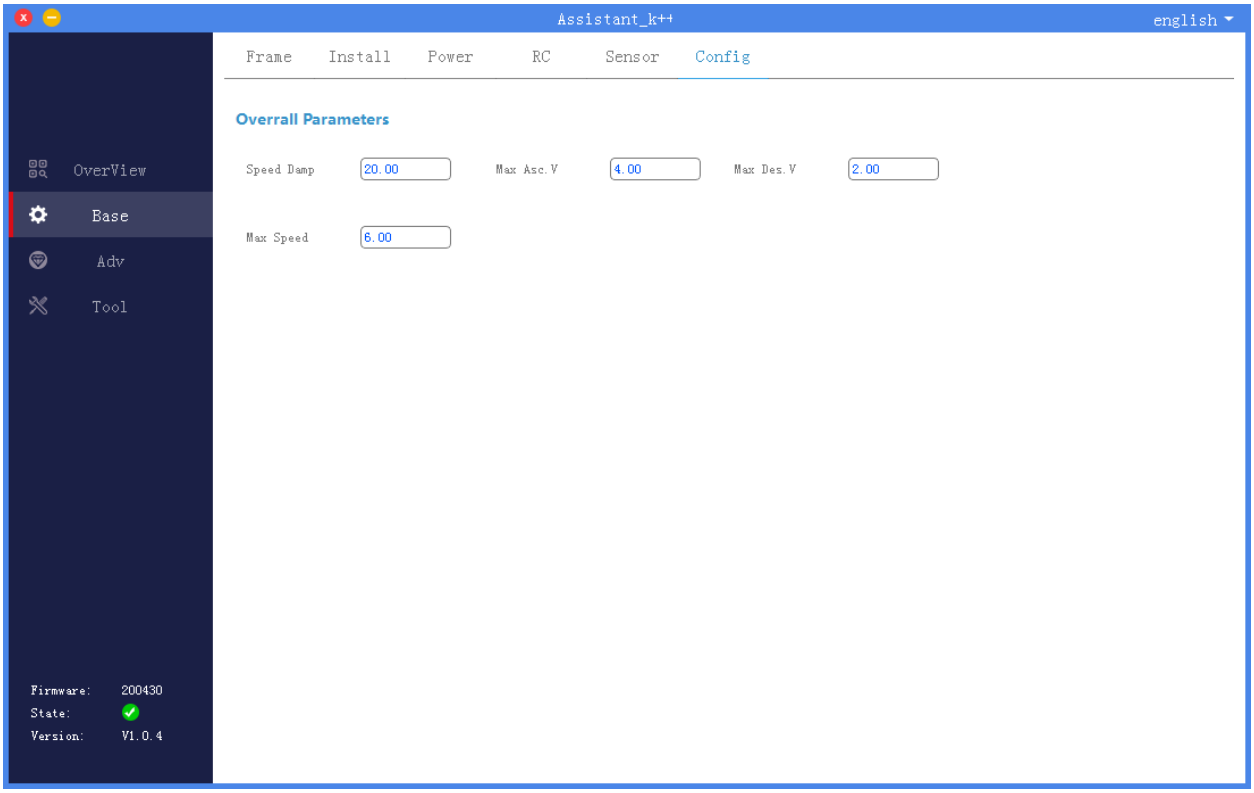
Click to enter the basic interface of the assistant software, and select flight parameters in the upper menu bar. As shown in the figure, the user needs to set the aircraft flight speed related parameters according to the actual model and operating environment.

Maximum tilt angle: The maximum tilt angle in all flight modes.

Maximum Ascent Speed: In addition to the Attitude Mode, the maximum ascent speed that the pilot can control.

Maximum descent speed: In addition to the attitude mode, the maximum descent speed that the pilot can control.

Maximum flight speed: Maximum horizontal speed in attitude mode and GPS mode.

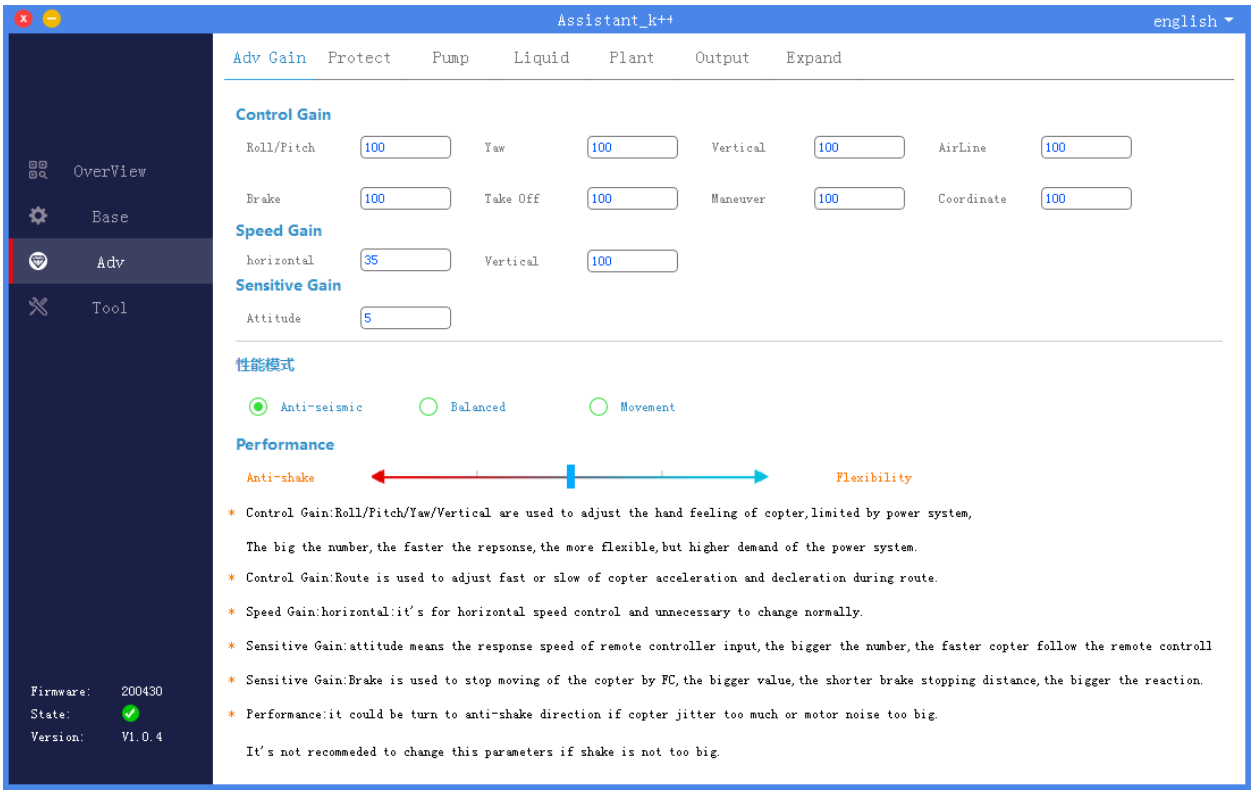


Advanced feature settings

Advanced function settings include advanced sensitivity, protection functions, pump settings, level gauges, plant protection functions, fence modules and expansion modules.

1. Advanced sensitivity

Click to enter the advanced interface of the assistant software, select the advanced sensitivity in the upper menu bar, as shown in the figure, set the advanced sensitivity parameters of the aircraft, etc.



1) .Parameter adjustment

The method of parameter adjustment is shown in the table:

Control sensitivity	Roll/Pitch	Adjust the control feel of controlling the pitch and roll. The larger the value, the faster the control response, and thinner to the limit of the aircraft's dynamic physical model. If the user's aircraft has poor maneuverability, the brake action is exaggerated and the attitude overshoot is serious during the fast maneuver, so the pitch and roll control sensitivity should be lowered.
	Yaw	Adjust the control feel of controlling yaw. The larger the value, the faster the control response, which is limited by the aircraft's dynamic physical model. If the aircraft is in the course of the course and back, there is a situation that affects the attitude, you need to lower the yaw control sensitivity.
	Vertical	The control feel of adjusting the control height. The larger the value, the faster the control, which is limited by the aircraft's dynamic physical model. Use the remote control to control the aircraft's rapid ascent and descent. If the attitude changes a lot during the altitude control, the vertical foundation sensitivity needs to be adjusted down.
	Route	Adjust the acceleration and deceleration speed of the aircraft during autonomous flight. The larger the value, the faster the acceleration and deceleration. The smaller the value, the smoother the aircraft movement. This parameter greatly affects the operation efficiency. If the maneuverability of the customer's aircraft allows, the larger the recommendation, the better.
	Brake	Adjust the speed of the aircraft when braking autonomously. The larger the value, the faster the brake, the smaller the value, the slower the brake, and the smoother the movement.
	Takeoff	Adjust the takeoff response of the aircraft. The larger the value, the faster the takeoff, and the dearer, the smaller the value, the smoother the takeoff.
	Maneuvering	Adjust the acceleration and deceleration speed of the aircraft. The larger the value, the faster the aircraft acceleration and deceleration, and the smaller the value, the smoother the aircraft movement. Generally, adjustment is not recommended.
	Coordination	It is used to adapt the coordination degree of control response and aircraft maneuver. The faster the dynamic response, the greater the value.

Speed sensitivity	Level	The gain of the aircraft's horizontal speed control, which is generally not recommended. If the aircraft nods during the course of the route, the nod will be reduced after the adjustment, but if the value is too low, it will affect the route accuracy and the positioning effect.
	Vertical	The gain of the aircraft's vertical speed control, which is generally not recommended. If the vertical base sensitivity is adjusted to a low level and high twitching still occurs, consider reducing the vertical speed sensitivity to improve it.
Spiritual sensitivity	Attitude	Adjust the speed of the flight control's response to the input commands of the remote control. The larger the value, the more sensitive the flight control is to the tracking of the remote control input. If the movement of the aircraft is still stiff after the pitch and roll control sensitivity is reduced, the handle feel will become softer after the adjustment.

2). Performance mode

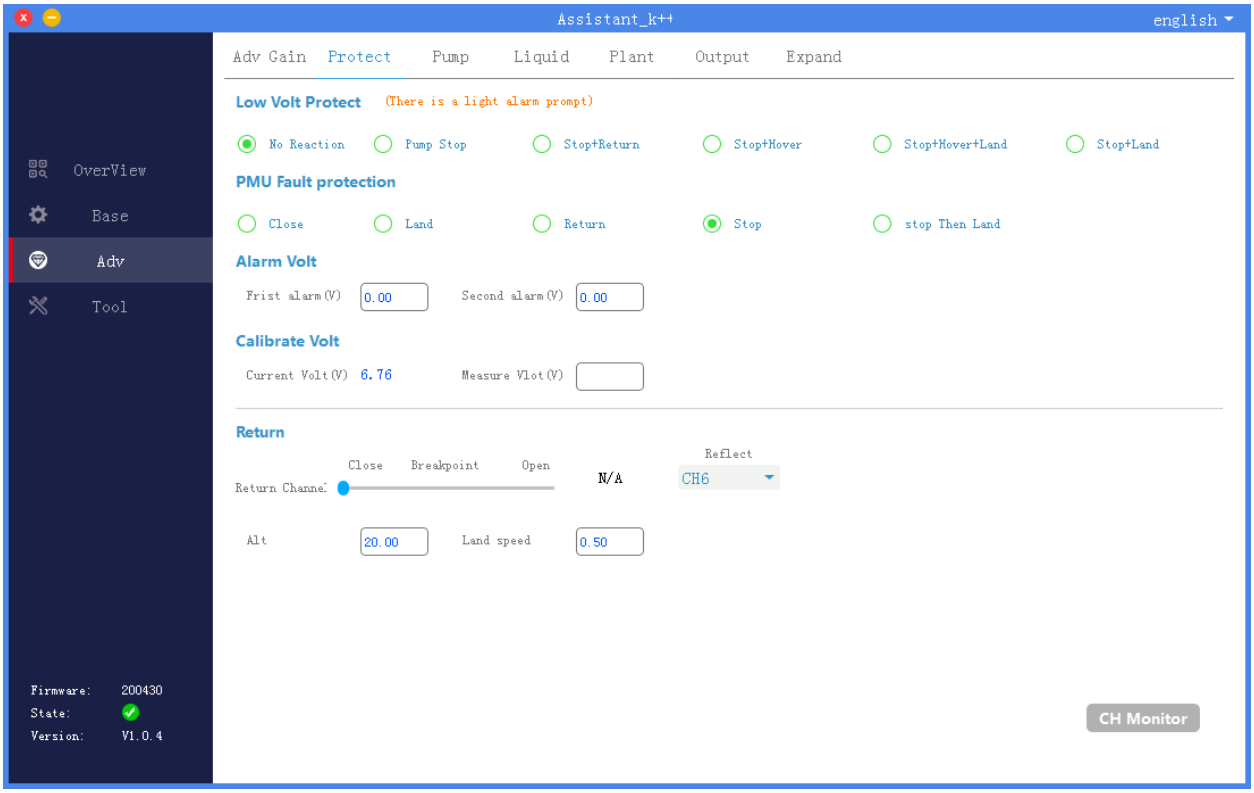
It is used to adapt to different types of racks. If flight instability occurs, different performance modes can be adjusted to achieve stable flight results.

3). Performance Orientation

If the aircraft appears obvious jitter or the motor output noise is large, the performance can be adjusted to suppress vibration. It is not recommended to adjust this parameter when the aircraft does not shake very much.

2. Protection function

Click to enter the advanced interface of the assistant software, and select the protection function in the upper menu bar. As shown in the figure, you can choose the low voltage protection and PMU fault protection type, set the alarm voltage, implement voltage calibration, and set the one-touch return function.



1) .Low voltage protection

K ++ V2 flight controller detects the battery voltage through the power module and provides low voltage protection. The flight controller provides six low-voltage protection behaviors: none, pump off, pump off + return, pump off + hover, pump off + landing after hovering, and pump off + landing. The user can make setting selections as needed.

2) .PMU fault protection

The flight controller provides five types of PMU fault protection behaviors: shutdown, landing, return to home, hover, and landing after hover. The user can make setting selections as needed.

3) .Alarm voltage

Set the value of the primary alarm voltage and secondary alarm voltage.

When the battery voltage detected by the flight control reaches the first-level alarm voltage, the flight control LED flashes yellow three times; when the detection voltage reaches the second-level alarm voltage, the yellow light flashes quickly, and the flight control will trigger the low-voltage protection behavior set by the user.

4). Calibration voltage

When the flight control detection voltage is different from the actual battery voltage, the flight control measurement voltage needs to be calibrated. You need to enter the actual voltage of the battery in the "Measured Voltage" column to calibrate the flight control voltage. Make sure the current voltage displayed by the flight controller is consistent with the actual battery voltage.

5) .One touch return

Altitude: The lowest flight altitude when returning with one touch.

Landing speed: The speed of the return home landing.

Note: When setting the return altitude, please set a reasonable altitude in accordance with the current flight environment to avoid obstacles during the return journey.

3 Water pump settings

Click to enter the advanced interface of the assistant software, and select the pump setting in the upper menu bar. As shown in the figure, select the pump type and channel settings according to the actual situation of the pump installed on the aircraft.

1). Pump type:

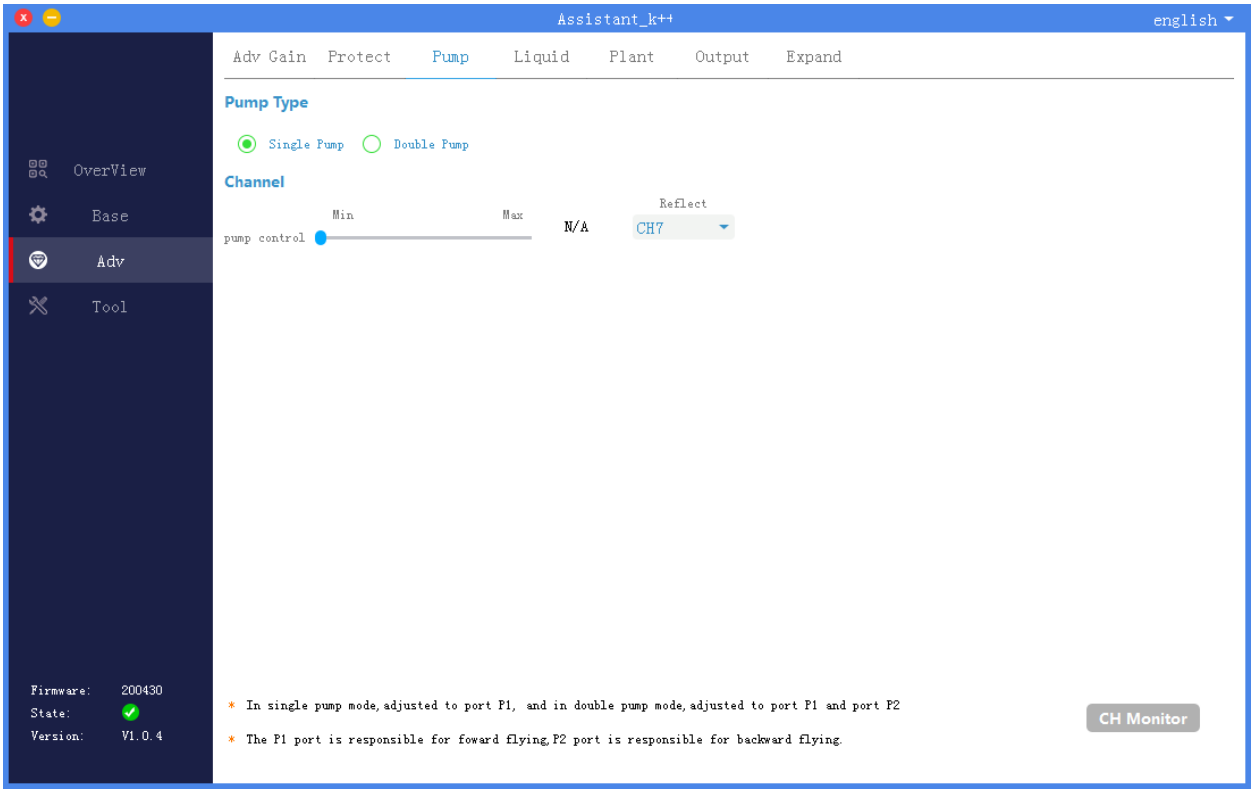
Single pump: water pump electrical connection P1

Double pump: Water pump electrical connection P1 and P2

Note: In dual-pump mode, the forward movement of the aircraft is controlled by the P1 port and the backward movement is controlled by the P2 port.

2) .Channel setting

The mapping channel is used to select the channel that the remote control controls the pump. The default is 7 channels. The user can set it according to the remote control.



4. Liquid level gauge

Click to enter the advanced interface of the assistant software, and select the level gauge in the upper menu bar, as shown in the figure, the level gauge type is selected, the current level gauge status and the drug protection setting.

1). Type of liquid level gauge:

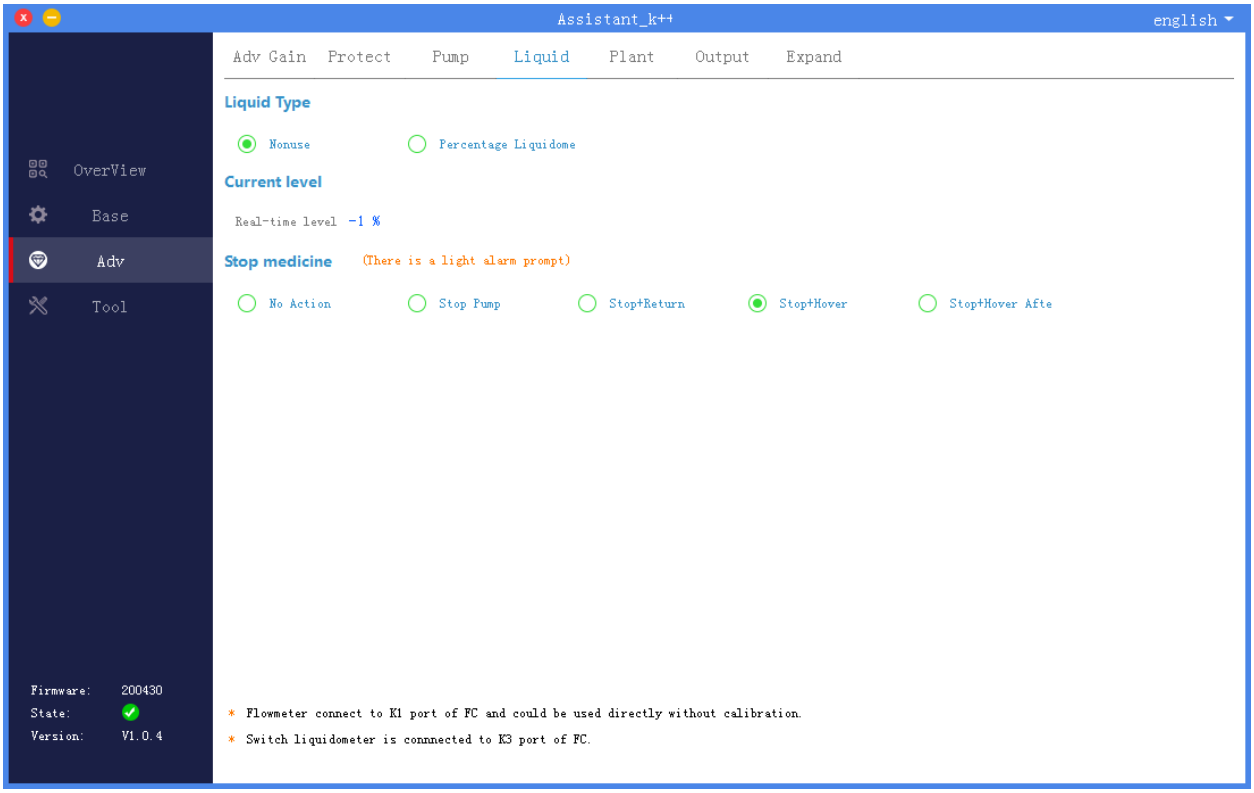
The switch level gauge needs to be connected to the flight control L1 port. Users connected to the flight control can choose to use or not use the switch level gauge according to their needs.

2). Current level:

Refresh the level gauge status in real time.

3). Drug protection:

The flight control set five kinds of drug protection behaviors: none, pump off, pump off + return, pump off + hover, pump off + landing after hovering. Users can choose according to their needs.



5. Plant protection function

Click to enter the advanced interface of the assistant software, and select the plant protection function in the upper menu bar. As shown in the figure, you can set the U-shaped lateral shift and AB point job settings.

1) .U-shaped lateral movement

The user can set the U-shaped traverse on and off as required. On by default.

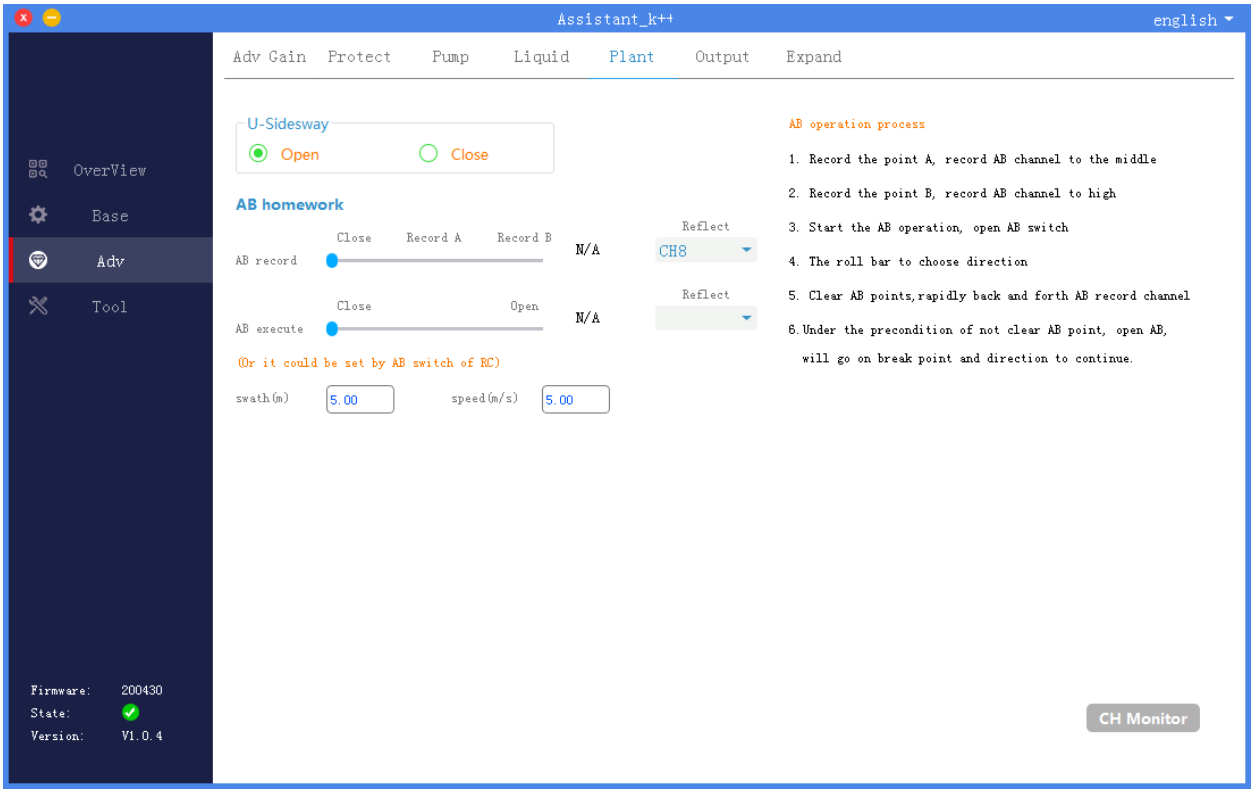
2). AB point job settings

AB record: The user can set the AB operation point record channel corresponding to the remote control as required. The default is 8 channels.

AB execution: The user sets the AB operation point execution channel corresponding to the remote control according to the needs. It is recommended that the user set the AB operation point execution channel in the remote control flight mode setting of the basic interface.

Banner: U-shaped traverse distance.

Speed: Maximum flight speed for AB operation.



6.Fence mode

Click to enter the advanced interface of the assistant software, select the fence mode in the upper menu bar, as shown in the figure, set the altitude limit, distance limit of the aircraft, and trigger the behavior of the fence function.

1). Height limitation:

The height limit is used to limit the flying height of the aircraft. The user can set the height of the fence and turn the height limit function on or off.

2). Distance limit:

The distance limit is used to limit the horizontal distance of the aircraft. The user can set the radius of the fence and turn the distance limit function on or off.

3). Trigger behavior:

Behaviour of the aircraft after reaching the fence boundary

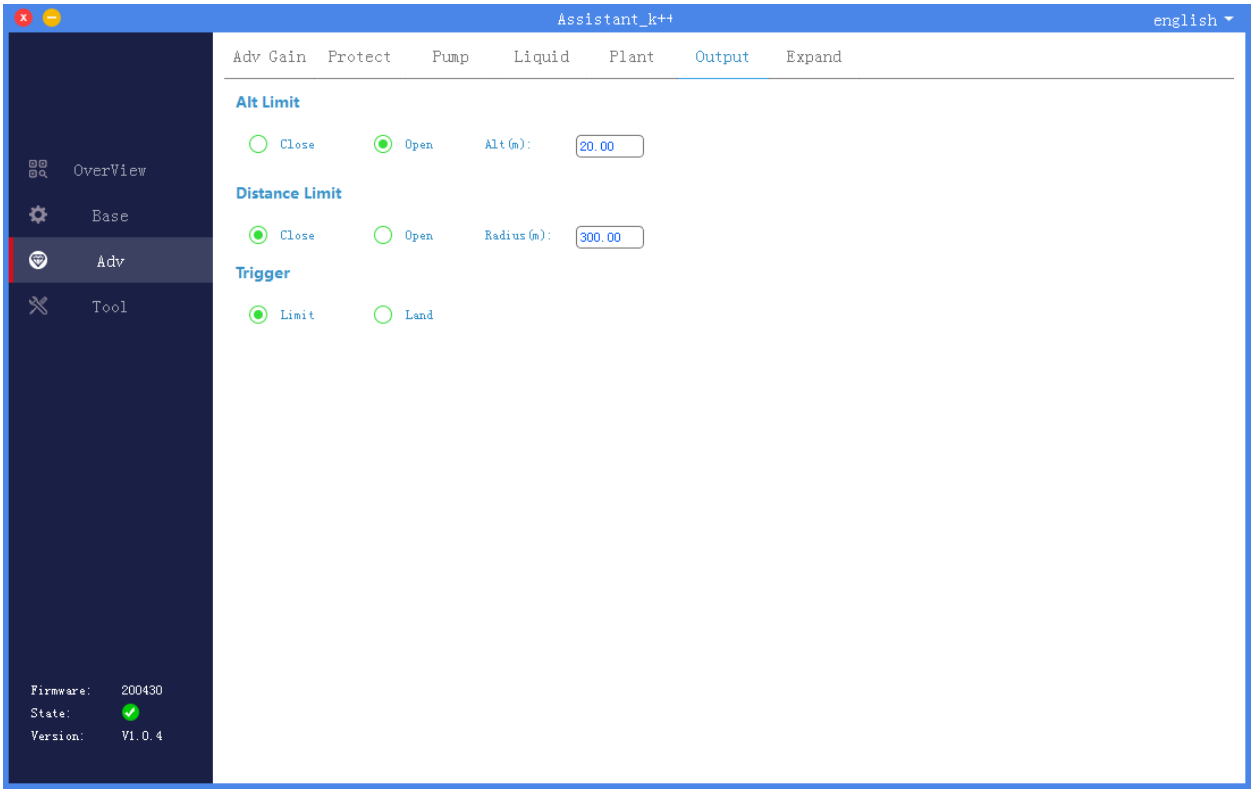
a. Restriction, the aircraft will not be able to break through the fence and can fly freely within the fenced area.

b. Return home. When the aircraft reaches the fence boundary, it will trigger an automatic return home.

note:

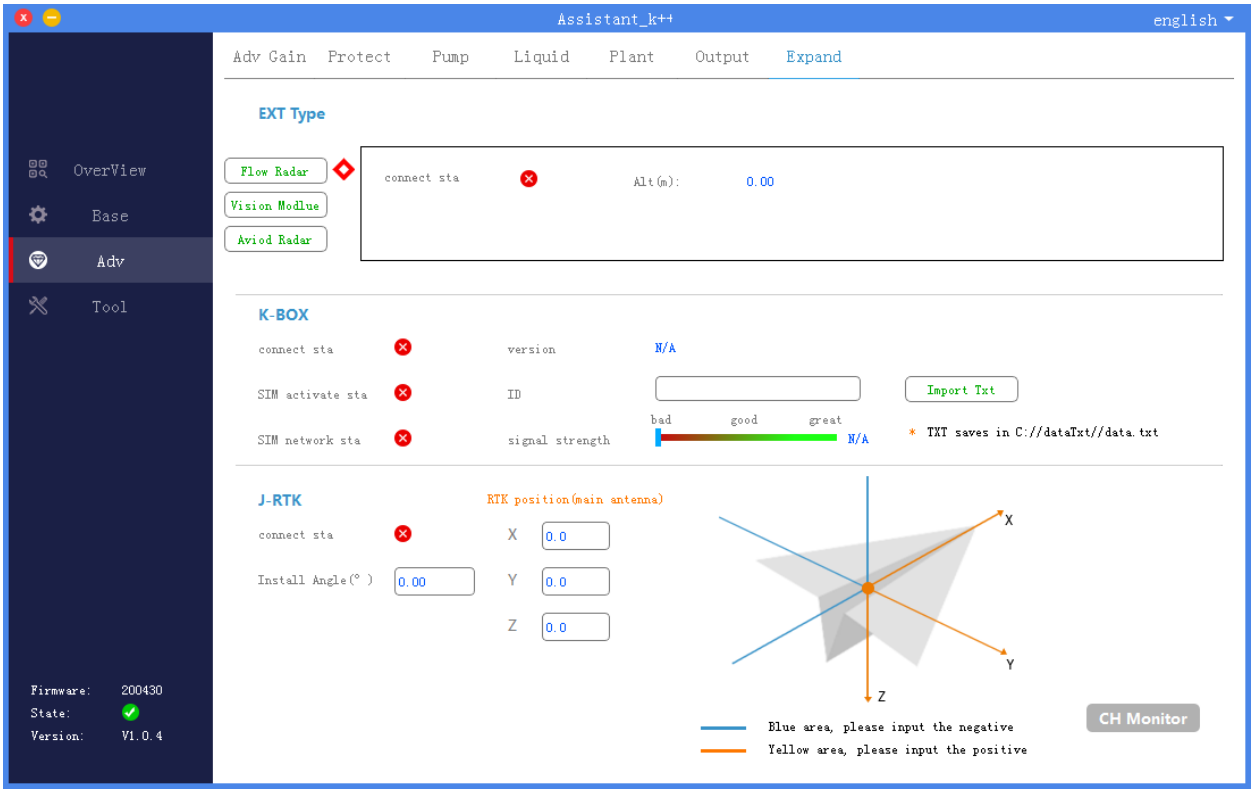
a. The height limit function of the fence is invalid in the attitude mode.

b. The distance limit function of the fence is invalid in the attitude mode.



7. Expansion module

On this interface, you can select the type of peripherals, terrain following terrain-like radar setting, obstacle avoidance radar module setting, K-BOX status information reading, RTK parameter reading and parameter setting.



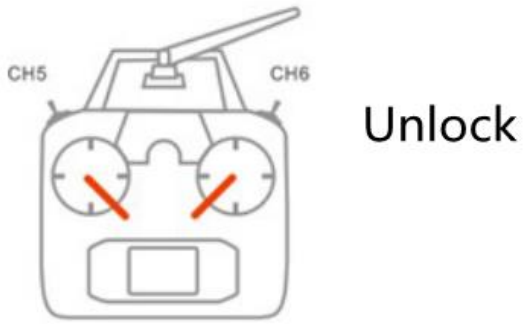
Flight Operations

Remote Control Function Introduction

1.Unlock and lock

1) .Unlock

Unlock it as shown in the figure. After unlocking, the motor enters the idle state.

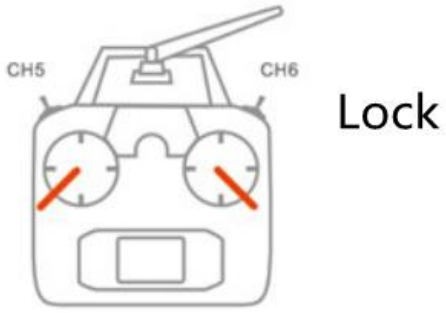


2) .Lock

a. Lock now

In any flight mode, the motor will stop immediately after the motor is started as shown in the figure.

Note: An emergency situation occurs during the flight of the aircraft. Please perform the operation of the figure to prevent accidents.



b. Automatic lock

All flight modes have an automatic landing recognition function, which will automatically control the stall. The aircraft will not stop the motor when the throttle is pulled to the minimum during flight.

2.Accelerometer calibration

The flight controller supports single-sided calibration of the accelerometer by the remote control. The calibration method is as follows:

1) .Place the aircraft horizontally

2). Turn the return channel to the highest position, and the remote control levers 打 (American hand) and ↗↘ (Japanese hand) flash red, green, and yellow to enter the calibration. Calibration is completed after 1-2 seconds, and the LED light flashes normally.

3 Magnetic compass calibration

K ++ flight control supports remote control rod calibration magnetic compass. The method is as follows.

When the flight control is not unlocked, quickly flip the 5th channel flight mode switch back and forth to enter the two-sided calibration of the magnetic compass. The yellow light is always on, and it is in horizontal calibration. At this time, place the aircraft horizontally and rotate the clockwise direction of the axis of gravity until the LED green light is always on, and enter vertical calibration. At this time, the nose is facing downwards, and the direction of gravity is the axis rotation until the LED red, green, and yellow flash alternately, and the calibration is completed.

4. Motor test

Motor test functions include motor sequence test and motion direction test, which are mainly used to check whether the motor installation serial number and rotation direction are correct, so as to avoid accidents caused by installation errors.

1). Motor sequence test

When it is not unlocked, the left side of the remote control will be driven by a ↙, and the right side will be rotated counterclockwise (American hand) to trigger the sequence test of the motor.

Japanese hand motor test shot method: 1, left stick ↙, right stick ↘ and hold; 2, then left stick, right stick ↙, left stick ↙, right stick ↘, the left stick remains the leftmost during the shot, Keep the right stick at the bottom, and repeat the four shots in step 2 in sequence to trigger the motor sequential detection.

Note: Under normal circumstances, a single shot can trigger the motor sequence detection. If the position is not accurate, you need to repeat step 2 to start the four shots.

2) Motor direction test

After unlocking, the aircraft propellers run at low idle speed evenly. The four channels of the remote control can determine whether the steering is reversed. For example, the idle stick is pushed forward, the propeller behind the aircraft rotates, and the propeller in front of the aircraft stops. Similarly, when the left fly rod is pressed, the aircraft is left. The propeller on the side stops and the propeller on the right side of the aircraft rotates.

5. Remote control runaway protection

First of all, you need to set the remote controller out-of-control protection correctly in the basics of the assistant software-> remote control interface. When the GPS satellite signal is good, if the receiver signal is lost, no matter which flight mode the aircraft is in, the flight controller will perform the out-of-control protection behavior. If the remote control signal is restored and you want to control the aircraft again, you need to switch the flight mode channel back and forth to gain control.

Flight Mode Introduction

1. Attitude mode

Attitude mode is suitable for returning to the central control user. IMU, GPS, magnetic compass and barometer participate in the flight. The attitude mode can automatically switch the control mode according to the GPS signal. If there is no GPS or the signal is not good, you can use fixed altitude flight. If the GPS signal is good, you can set the fixed altitude. There is no imitation function in the attitude mode.

1). Working conditions

Since the attitude mode requires the GPS module to participate in the work, it must wait for the satellite search to complete and the positioning accuracy to meet the requirements. As shown in the figure below, when the LED indicates that the GPS status is normal GPS signal, GPS signal is good, or RTK positioning, you can unlock or enter this mode in this mode.

GPS Representation	Light State Indication	Priority Level
GPS not connected / GPS not receiving satellite	Red Three Flashes	Low
Poor GPS signal	Red Double Flash	Low
General GPS signal	Red Single Flash	Low
The GPS signal is very good	Red No Flash	Low
RTK Positioning	Yellow Single Flash	

Flight control can only be unlocked in attitude mode, other modes cannot be unlocked. After entering the attitude mode, the LED flashes green.

2). Operating instructions

After the GPS search is over, after the positioning is successful, the remote control switches the 5-channel mode switch to the attitude mode position. After the joystick is unlocked, the throttle motor below 50% is at idle speed. When the throttle is more than 50%, the throttle is gently pushed to take off and the throttle lever is set to 50 At the% position, the aircraft is fixed. When the aircraft is in motion, all the joysticks of the remote control are returned to the center, and the aircraft will automatically brake and hover.

The corresponding functions of the joystick are as follows

Channel 1	Control the roll angle of the aircraft
Channel 2	Control the pitch angle of the aircraft
Channel 3	Control the up and down movement of the aircraft, when the throttle is in the neutral position, the aircraft is in a fixed height state
Channel 4	Control the rotation rate of the aircraft yaw direction

2.Manual operation mode

Manual operation mode, also known as GPS mode, IMU, GPS, magnetic compass and barometer participate in the process of flight. This mode has imitation ground function.

1). Working conditions

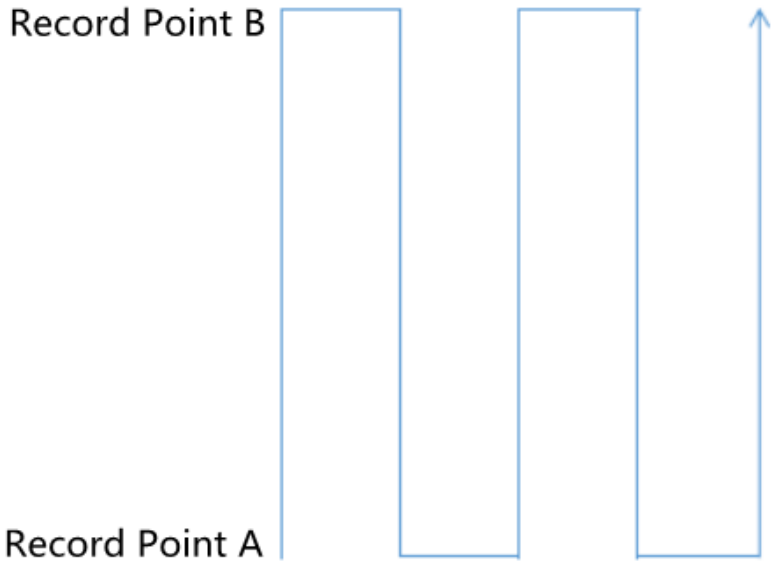
The working conditions are the same as the attitude mode. It cannot be unlocked in this mode. You need to switch to this mode first after unlocking in attitude mode. After entering the manual operation mode, the green LED flashes twice.

2). Operating instructions

After unlocking in attitude mode, the remote controller switches the 5-channel mode switch to the manual operation mode position, and when the throttle stick is set to the 50% position, the aircraft sets the height and the fixed point. When the aircraft is in motion, all the joysticks of the remote control are returned to the center, and the aircraft will automatically brake and hover.

3.AB operation mode

AB operation mode, that is, AB execution, U-shaped operation is performed through the AB point set by the user, as shown in the figure.



1). Working conditions

Before using this mode, you need to connect the assistant software to set the channel.

AB point record setting: Open the assistant software and enter “Advanced”-> “Plant protection function”-> “AB record”, select the channel in the drop-down box of the mapping channel on the right.

AB execution setting: K ++ supports two ways for AB execution setting.

Method 1 ： (recommended): Open the assistant software and enter “Basic”-> “Remote Controller Settings”-> “Airplane Mode”, and select one of the three drop-down boxes to set to AB execution.

Method 2: Open the assistant software and enter “Advanced”-> “Plant protection function”-> “AB execution”, and select the channel in the drop-down box of the mapping channel on the right.

It cannot be unlocked in this mode.

2). Operating instructions

Step 1: Clear AB point

Quickly flip the AB point recording channel back and forth, and the LED lights flash red, green, and yellow alternately and fast to clear it. If you want to fly to the point of drug withdrawal, skip this step.

Step 2: Switch to AB operation mode

The remote control switches the 5-channel mode switch to the AB operation mode position.

Step 3: Record point A

Hover in AB operation mode and dial the AB record control lever to the second gear. After the recording is completed, the LED flashes yellow for 2 seconds.

Step 4: Record point B

Hover in AB operation mode and dial the AB record control lever to the third gear. After the recording is completed, the LED flashes green for 2 seconds.

Step 5: Choose a direction

Select the direction by turning the roll lever. Move the roll lever to the left to move to the left, and move the roll lever to the right to move to the right. The premise of performing this step is that the last recorded AB point has been cleared, otherwise the step will be skipped and continued according to the last AB job.

Step 6: Continue spraying at the breakpoint

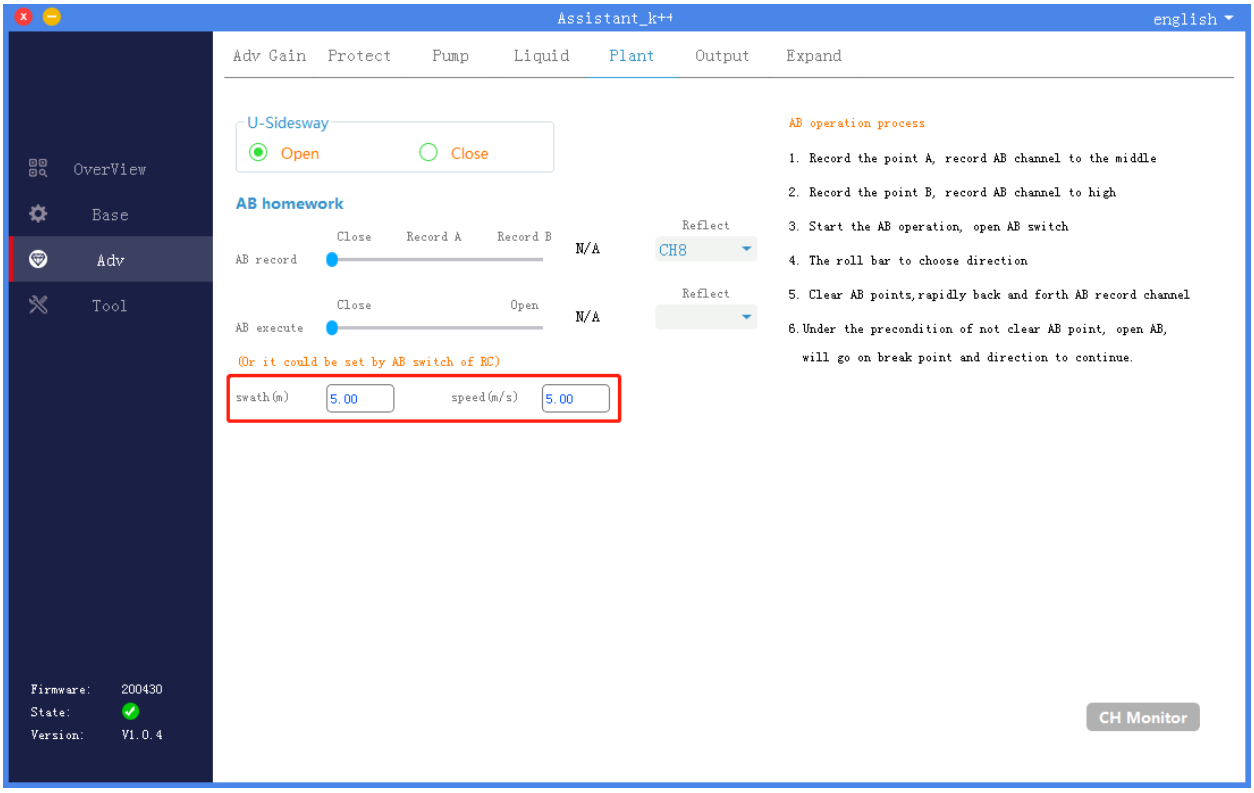
Under the premise that the AB point record is not cleared, switching to the AB operation mode will continue the operation of the last stop of the drug point and direction.

The remote control can manually control the aircraft during AB operation.

3) .Parameter setting

K ++ V2 supports assistant software and APP to set the banner and speed of AB jobs.

Assistant software settings: Enter the “Advanced”-“Plant Protection Function”-“AB Job” of the assistant software to set the banner and speed, as shown in the figure.



APP setting: Enter the APP parameter setting page to set the line spacing and route speed, as shown in the figure.

4). AB point lengthening and shortening

K ++ V2 supports extending and shortening AB points during flight.

When flying from point A to point B: push the pitch stick upwards, point B stretches forward, push the pitch rod down, and point B shortens backwards;

When flying from point B to point A: push the tilt stick up, point A shortens backwards, push the tilt stick down, and point A shortens backwards.

4. Route operation mode

Flight route operation mode, that is, the flight controller will autonomously operate the plot after planning the land through the mobile APP and adjusting the flight route.

1). Working conditions

After the star search is completed and the positioning accuracy meets the requirements (the LED does not flash red or the red light flashes single), click on the execution job in the APP execution job interface. After setting the parameters, the flight control will automatically unlock and take off. After entering the route operation mode, the green LED flashes four times.

2). Operating instructions

For detailed operation, please refer to the APP instruction manual.

5.Auto return mode

The auto return mode provides safety guarantee for long distance flight and runaway protection.

1). Working conditions

After the star search is completed and the positioning accuracy reaches the requirements (the red LED does not flash or the red light flashes only once), the flight controller will automatically record the current position as the home point each time the user unlocks. After entering the auto return mode, the green LED flashes quickly.

2). Operating instructions

The auto return mode can be triggered by the joystick or by runaway protection. When the remote control CH6 mode switch is set to the one-touch return position or the flight control enters the out-of-control protection, if the aircraft is more than 2 meters away from the return point, the aircraft will automatically rise to the set altitude (if the current altitude is greater than the set return altitude, press Return to current altitude). After reaching the return point, the aircraft will first hover in the air for about 3 seconds and then land slowly. At this time, the flight status of the aircraft can be controlled by the remote control joystick (but the throttle lever does not work), making it easier for the aircraft to find a more suitable landing. point. After the aircraft has fully landed, the aircraft will automatically lock. If the aircraft is less than 2 meters from the home point, the aircraft will land in place and lock automatically.

Precautions:

The premise of automatic return is that the return point of the aircraft has been recorded. If you need to use the automatic return, please unlock it after the GPS search is completed. Please refer to the appendix LED three-color light for status and meaning.

When the aircraft is close to people, it is recommended not to switch to the auto return mode to avoid accidents.

Advanced Features

1. Terrain following function

Terrain following function, namely the imitation ground function, the realization of this function requires access to the imitation ground radar module.

Under this function, the aircraft can maintain a relatively fixed distance from the ground for flight. The remote control can temporarily change the altitude through the throttle, but after the throttle returns to the center, the aircraft automatically returns to the set altitude.

1). Connect

Connect the radar to the CAN interface of CANHUB.

2). Installation

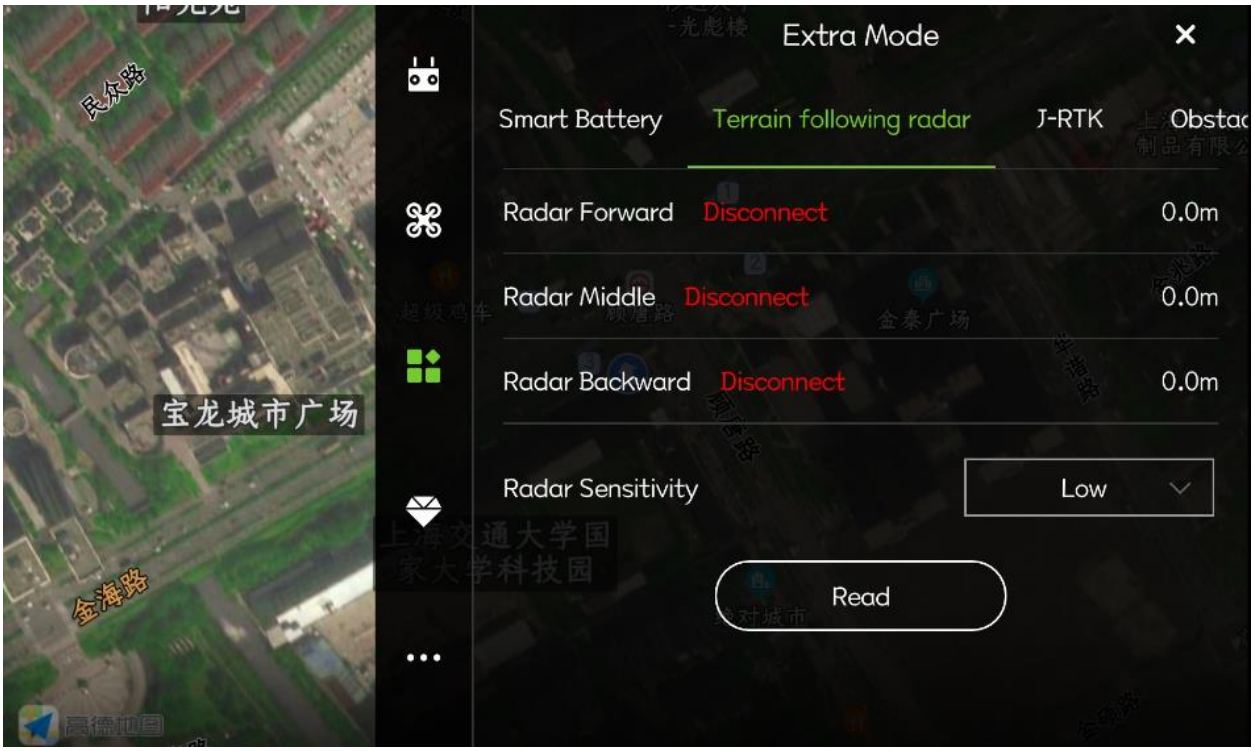
Install the radar face down under the aircraft to ensure that there are no obstructions within the 60cm diameter of the radar detection path, to ensure that it is firmly fixed, not offset, and not loose, and to ensure that the imitation radar does not touch the ground when landing.

3). Detection

When the radar is connected to the flight controller, you can use the assistant software and APP to check whether the ground-like radar is working normally.

a. Connect the assistant software, enter “View”-> “Expansion Module”, and observe if there is radar height data to judge whether it is valid and working normally.

b. Connect to the APP, enter the main page, and observe the data of the imitation module in the extension module to determine whether it is valid and working normally.



2. Breakpoint continuous spray function

K ++ V2 supports the function of continuous injection of breakpoints. In the case of unfinished jobs, users will automatically record the breakpoints when they pause or exit the operation mode.

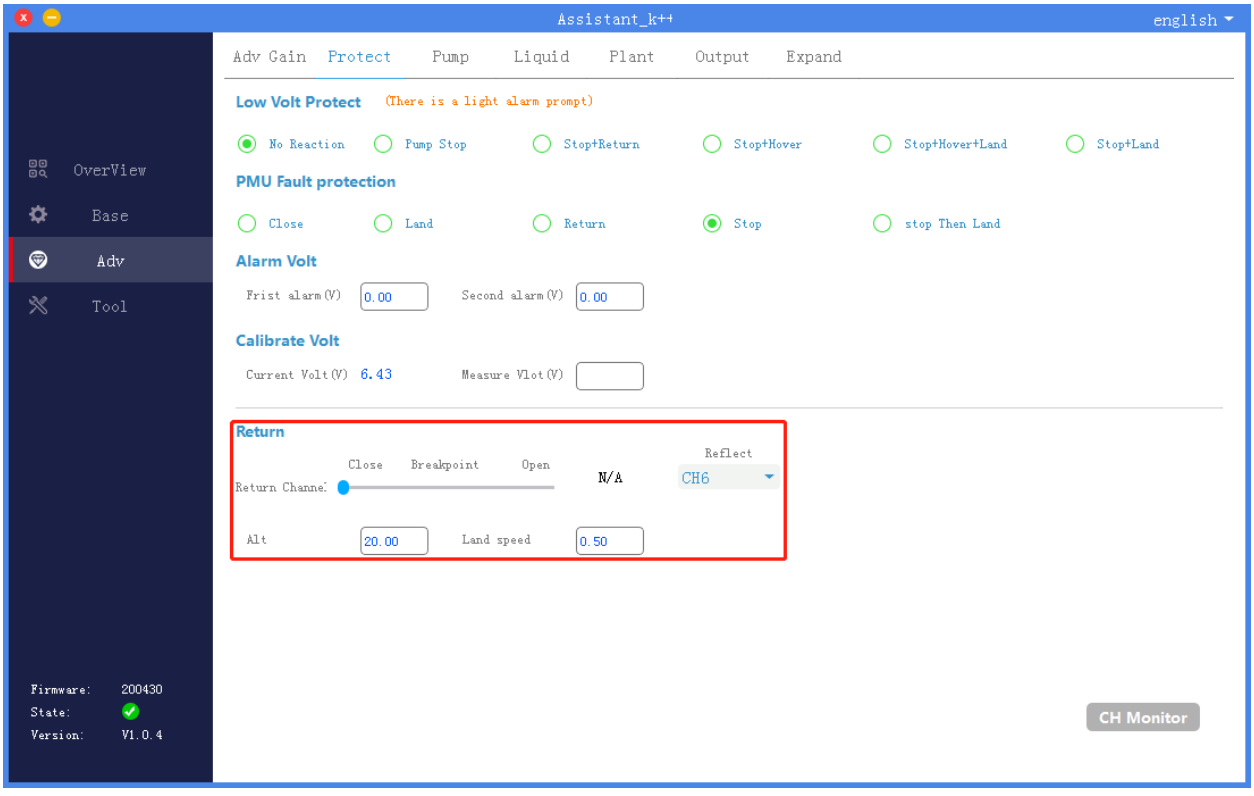
Continue to work or re-enter the work mode, the aircraft will automatically return to the last work breakpoint.

3.One-key return function

K ++ V2 supports remote control or APP to control the aircraft to return home with one click.

1) .Setting

Before executing this function, you need to set the mapping channel, altitude and landing speed in "Advanced"-> "Protection Function" in the assistant software.



2). Execution

Turn the switch of the return route from the closed position to the open position to realize one-key return.

4.Remote control runaway protection function

K ++ V2 supports setting the remote control out of control protection.

1) .Setting

Before executing this function, you need to enable the out-of-control protection in the "Basic"-> "Remote Controller" in the Assistant Software.

2). Execution

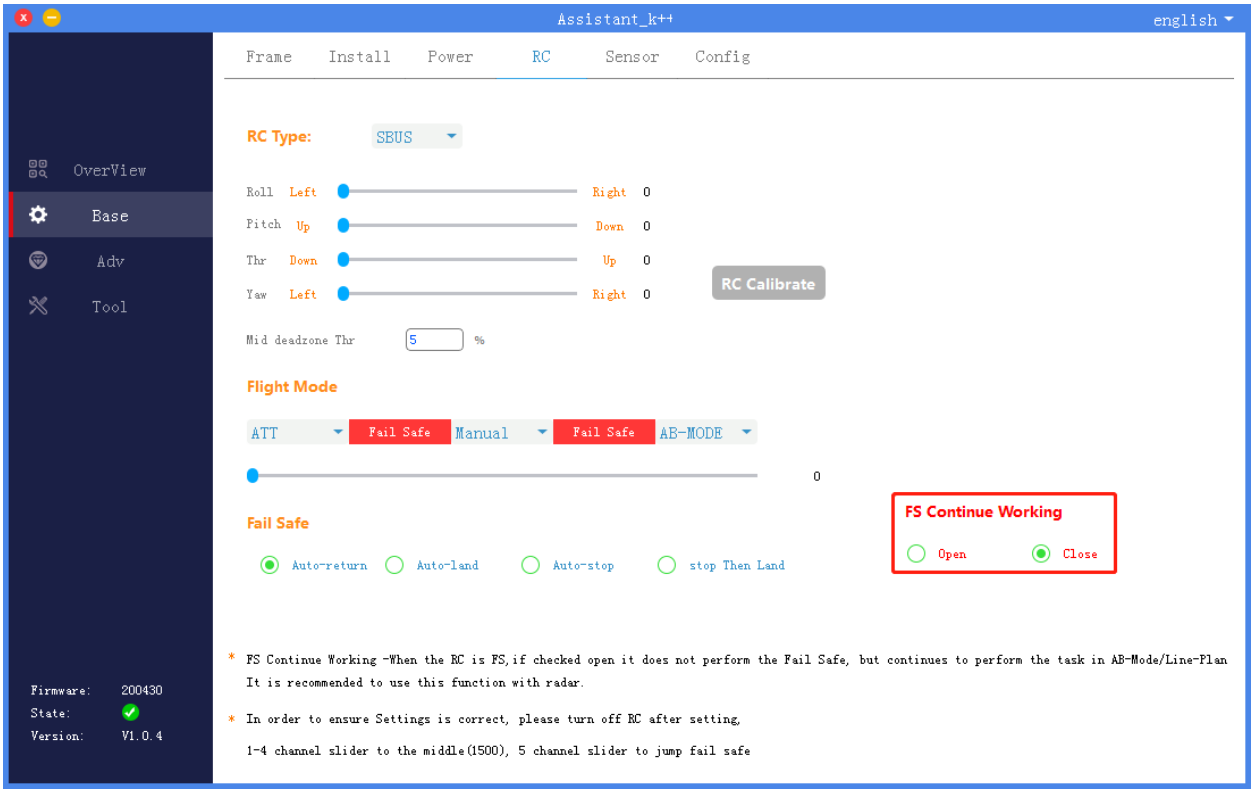
After the runaway protection function is enabled, the flight controller will perform the set runaway protection behavior after the remote control signal is interrupted.

5. Out of control resume operation function

K ++ V2 supports the function of setting out of control to continue the operation so that the aircraft will continue to work after the remote control is out of control.

1) .Setting

Before executing this function, you need to turn on the "Basic"-> "Remote Controller" in the Assistant Software to run out of control to continue the route operation.



2). Execution

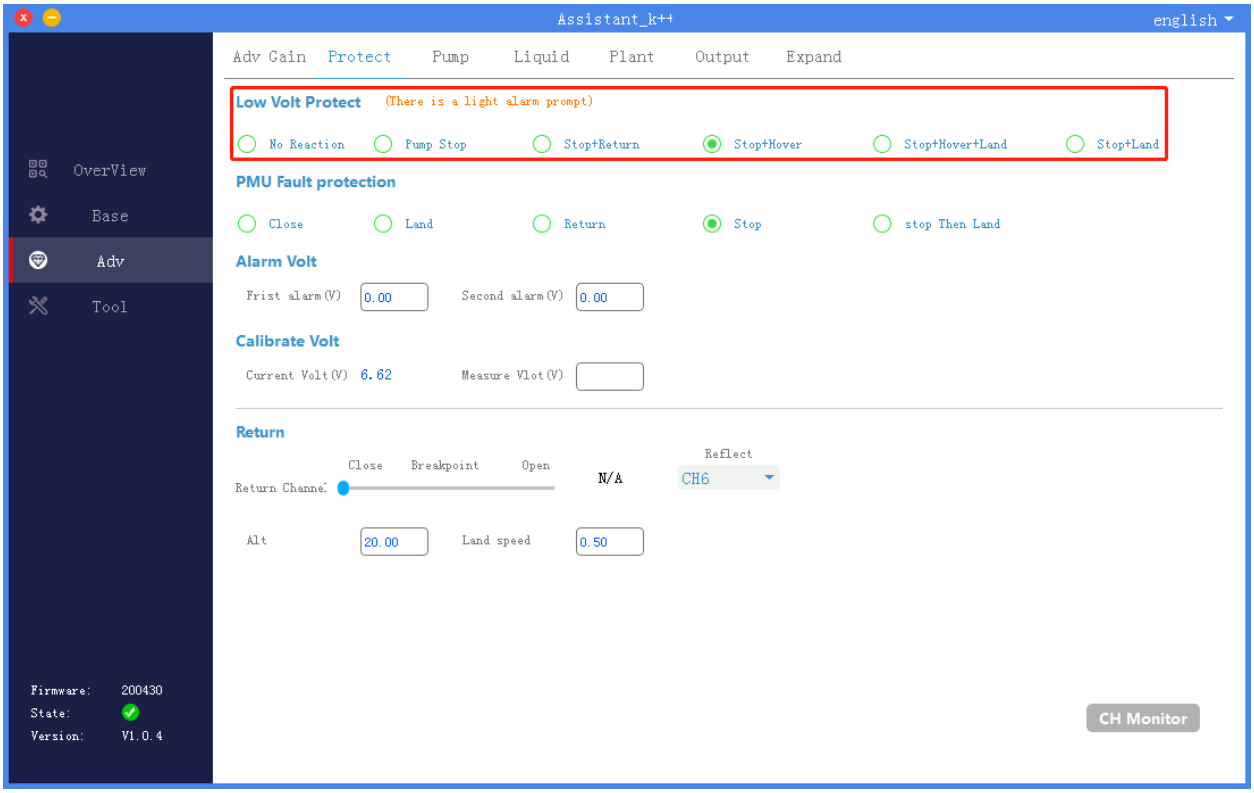
When the out-of-control continue operation option is enabled, the out-of-control protection will not be performed after the remote control is out of control in the operation mode (AB operation, route operation), but the operation task will continue to be performed. It is recommended to use this function with the radar.

6. Low voltage protection function

K ++ V2 supports setting low voltage protection function.

1) .Setting

Before executing this function, you need to enable the runaway protection in the "Advanced"-> "Protection Function" in the Assistant Software. K ++ V2 flight controller detects the battery voltage through the power module and provides low voltage protection. The flight controller provides six low-voltage protection behaviors: none, pump off, pump off + return, pump off + hover, pump off + landing after hovering, and pump off + landing. The user can make setting selections as needed.



2). Execution

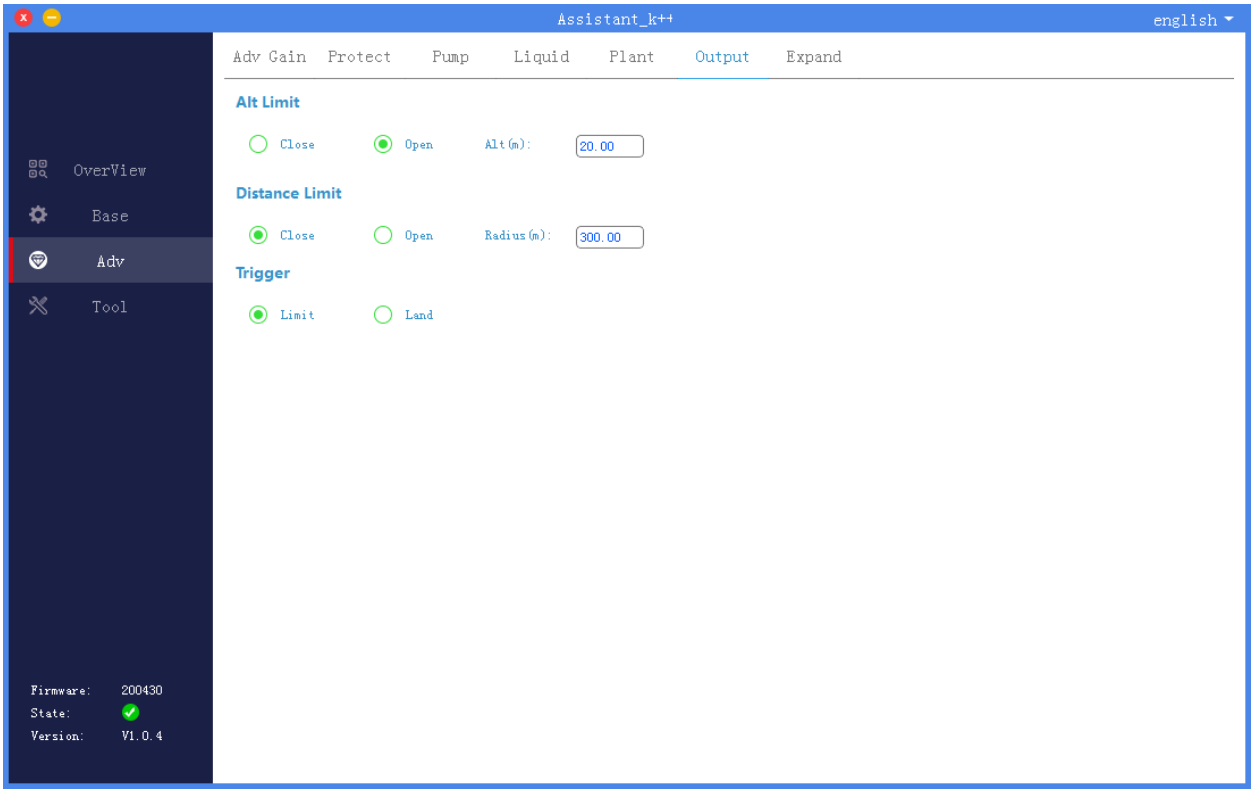
After enabling the low voltage protection function, the flight controller will perform the low voltage protection behavior after the battery voltage is lower than the secondary alarm voltage.

7. Fence function

K ++ V2 supports assistant software to set the fence function.

1) .Setting

Before executing this function, you need to set the height limit, distance limit and trigger behavior in the "Advanced"-> "Fence Function" in the assistant software.



2). Execution

After the fence function is turned on, the aircraft will automatically perform the triggering action after reaching the set altitude and distance.

8. Log storage function

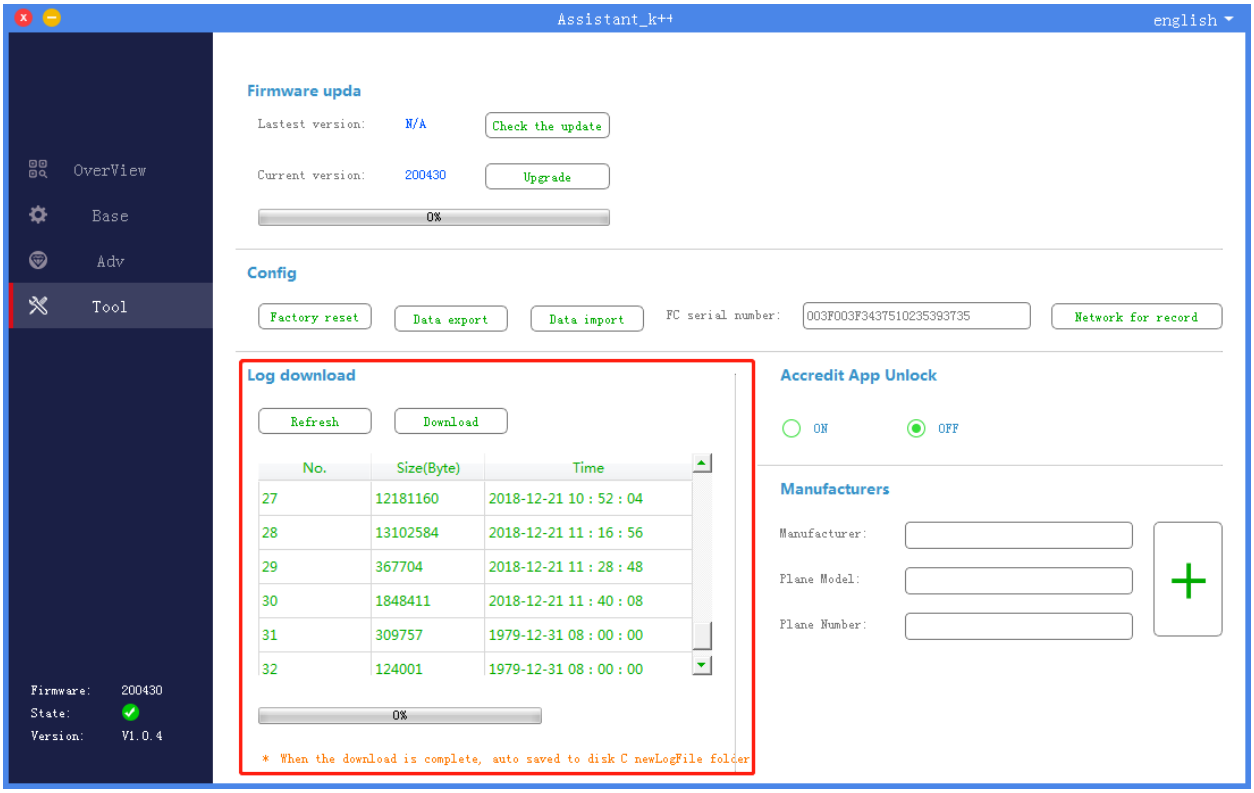
K ++ V2 supports assistant software to download flight log, which is convenient for analyzing aircraft status.

1) .Refresh

In the assistant software, click "Tools"-> "Log Download" to refresh.

2). Download

After refreshing, click Download to download the flight log, which is saved in the newLogFile folder of the C drive by default.



9. Landing lock function

K ++ V2 supports the landing lock function. After the user lowers the throttle to land, the flight control will automatically lock the motor when it detects that the aircraft is landing.

10. No-fly zone function

K ++ V2 sets the airport area as a no-fly zone when it leaves the factory. If you need to lift the ban, you must first apply for lifting the ban on the app device management page, which is approved by the manufacturer.

11.Vibration protection function

When K ++ V2 detects abnormal vibration of the aircraft, it will automatically switch to the safe mode to ensure the flight safety of the aircraft. In safe mode, the user can manually control the landing of the aircraft.

12. Star drop protection function

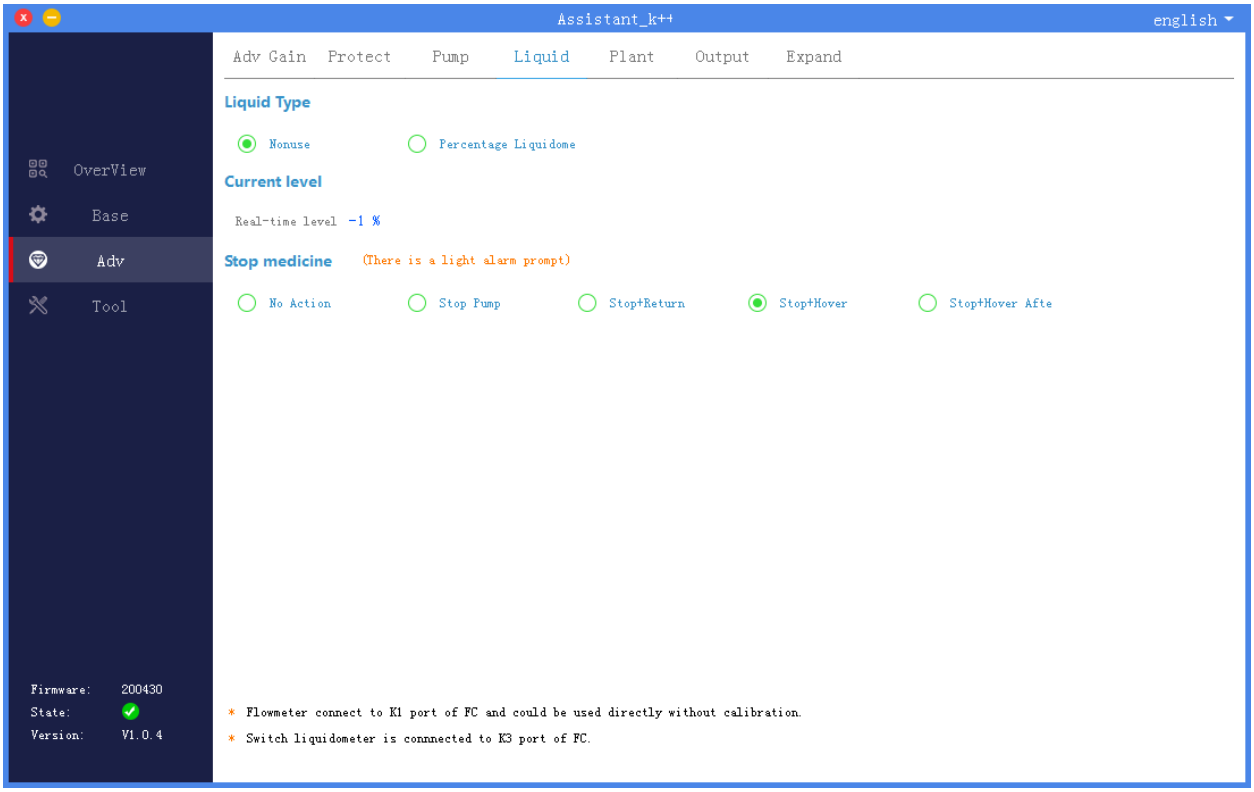
K ++ V2 will automatically switch to the safe mode when it detects GPS star drop or data abnormality to ensure the flight safety of the aircraft. In safe mode, the user can manually control the landing of the aircraft.

13. Withdrawal protection function

K ++ V2 supports withdrawal protection.

1) .Setting

To execute this function, you need to set the drug-break protection behavior in "Advanced"-> "Level Gauge" in the assistant software. K ++ V2 flight controller set five kinds of drug protection behaviors: none, pump off, pump off + return, pump off + hover, pump off + landing after hovering.

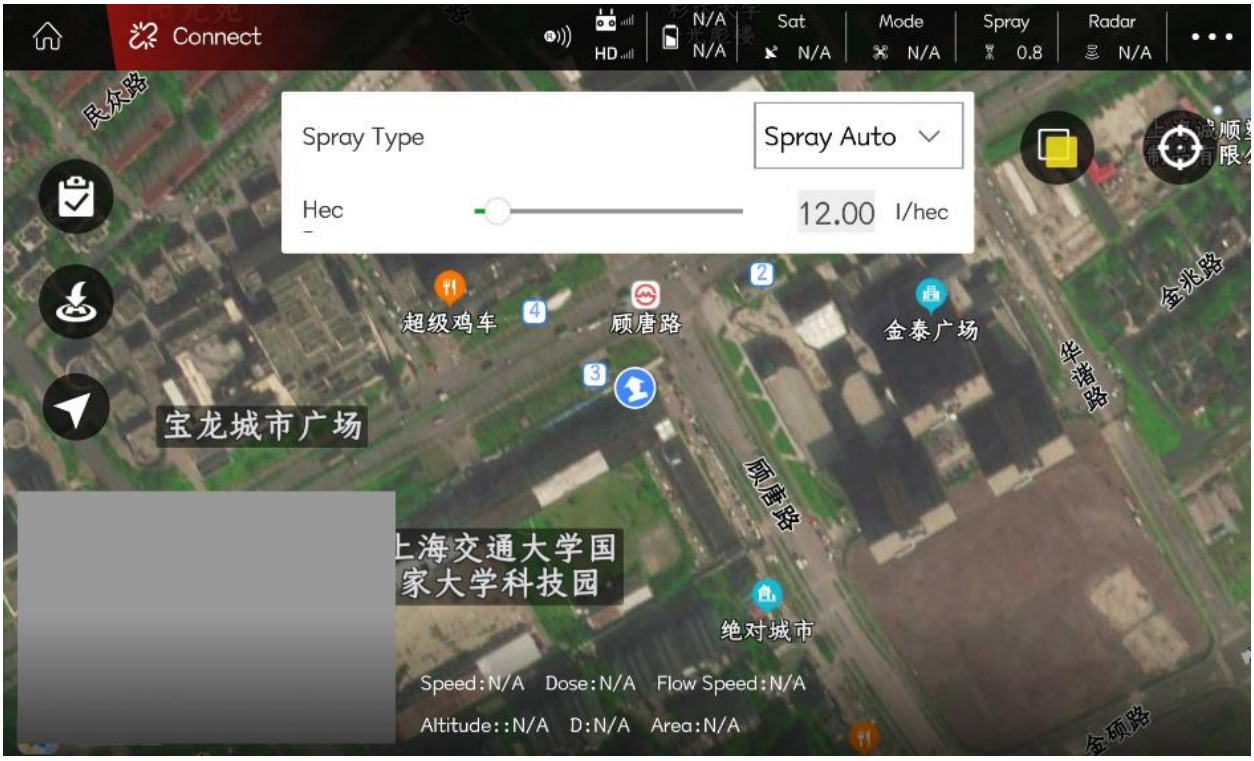


2). Execution

During the flight, it will automatically detect whether the medicine is cut off, and the medicine will be protected after the medicine is cut off.

14.Precise spraying function

K ++ V2 can realize the precise spraying function. Users need to click on the upper right corner of the spraying butler app execution interface to select the spraying mode as precision spraying. Enter the amount of acres to achieve precise spraying.



15.Double water pump mode

K ++ V2 supports dual water pump mode.

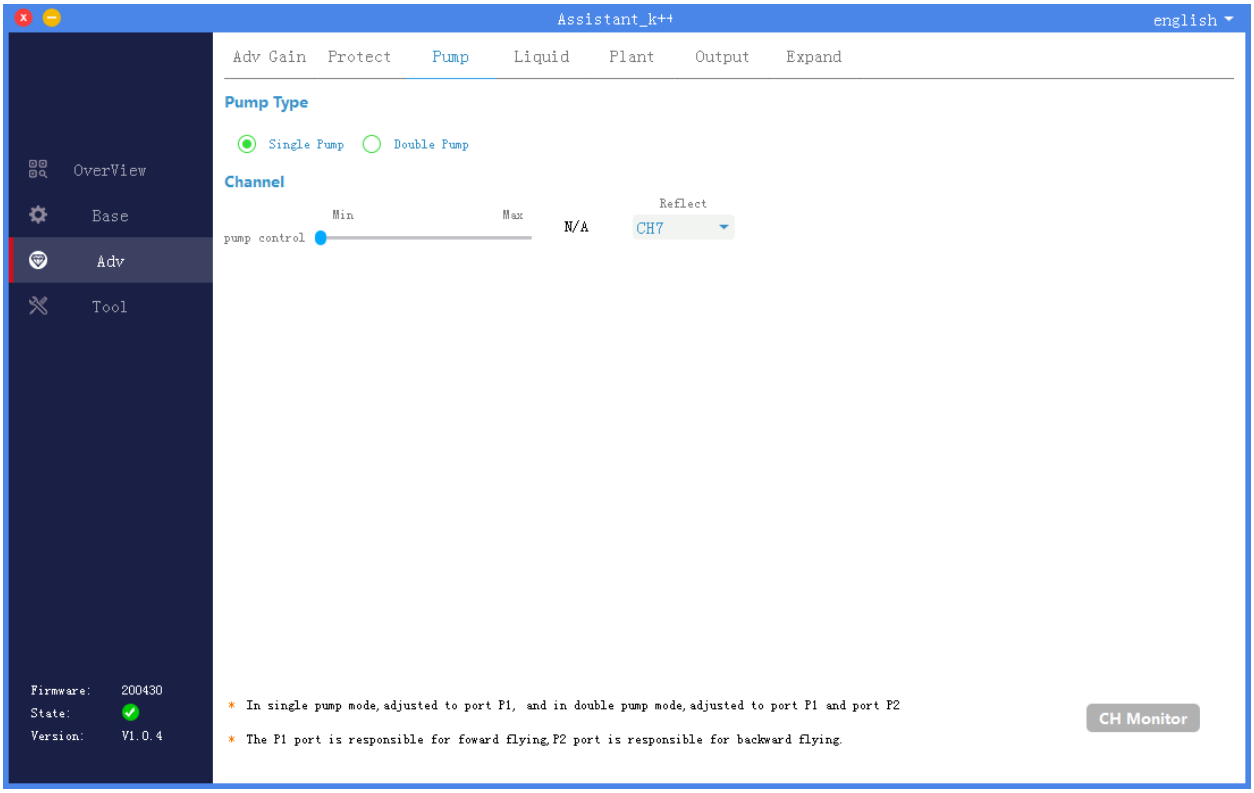
1). Connect

Single pump: water pump electrical connection P1

Double pump: Water pump is electrically connected to P1 and P2. In the dual-pump mode, the forward movement of the aircraft is controlled by the P1 port and the backward movement is controlled by the P2 port.

2) .Pump type setting

In the assistant software "Advanced"-> "Pump Settings" select the dual pump.

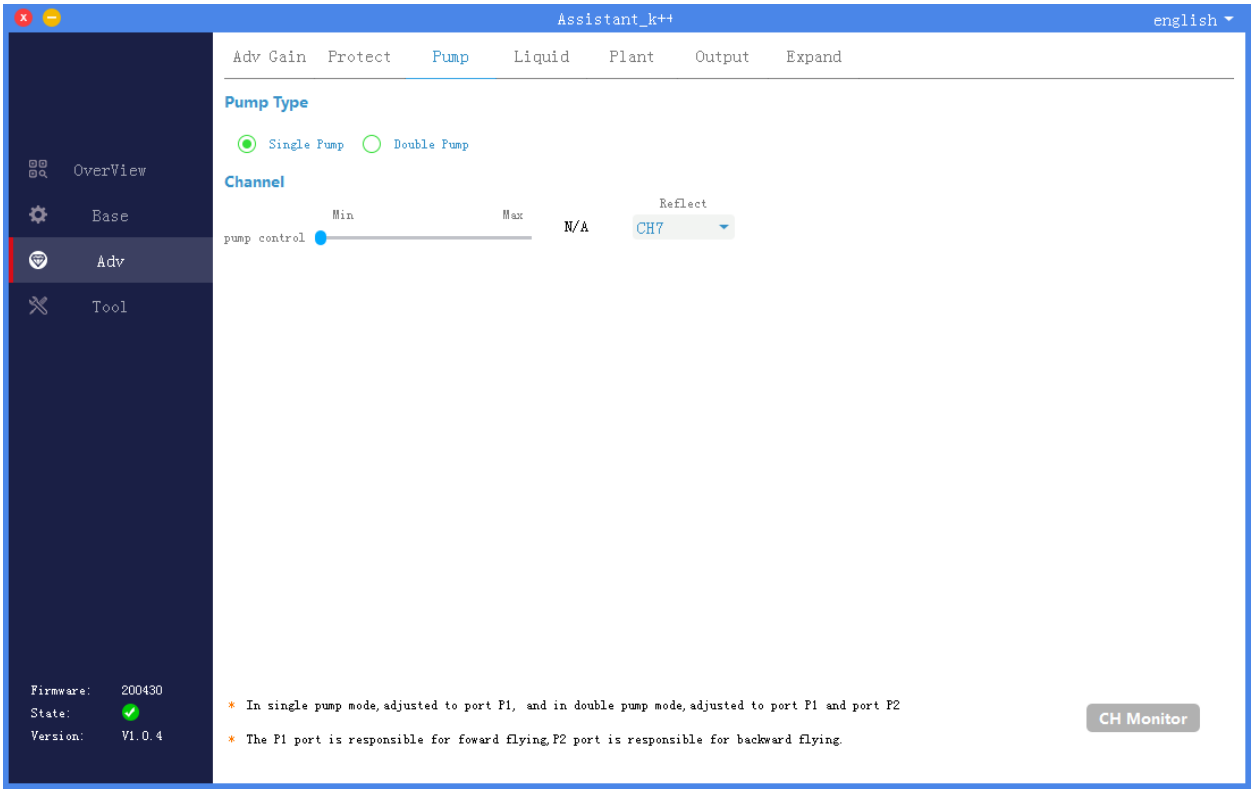


16.Water pump switch control function

K ++ V2 supports remote control to control the pump switch.

1) .Setting

In the assistant software “Advanced”-> “Pump Settings”, select the remote control mapping channel. The default is 7 channels.



2). Execution

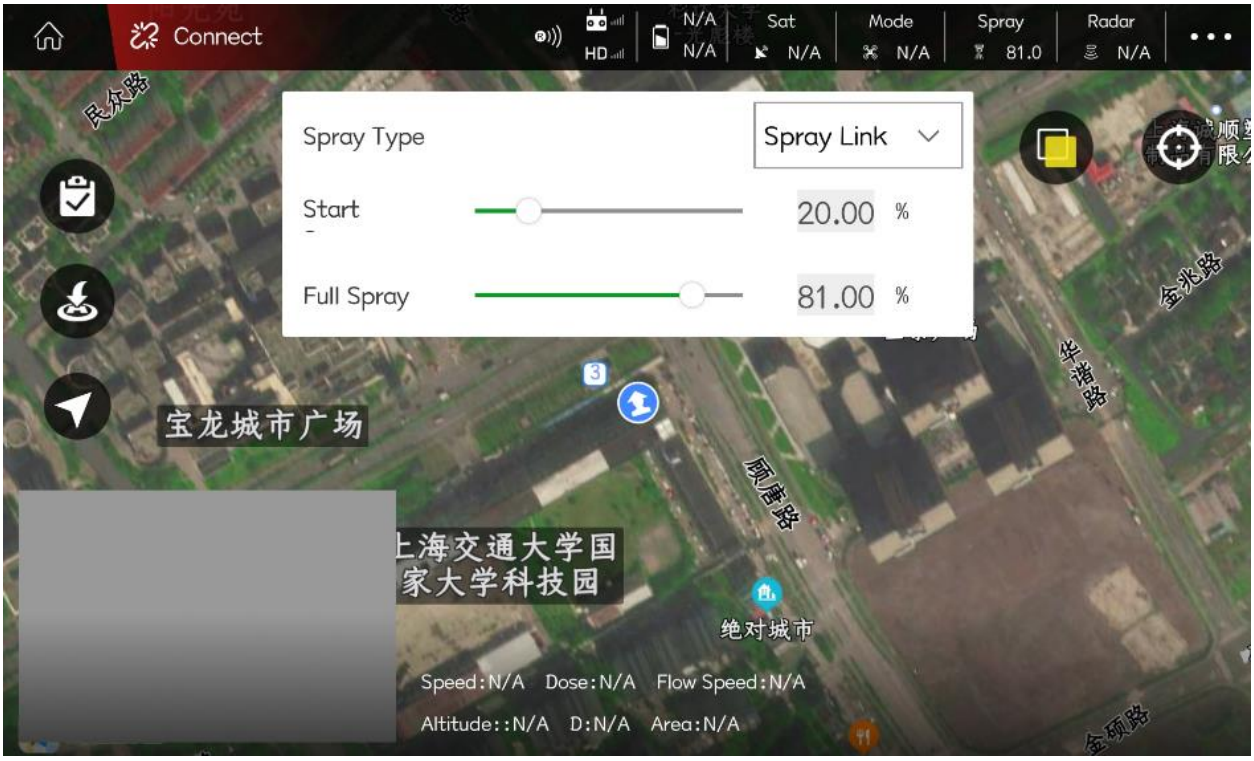
In attitude mode and GPS mode, when the remote control pump control channel switch is turned on, the pump will start working, and when it is turned off, the pump will be turned off.

Note: The AB operation mode and the route operation mode are controlled by the flight control autonomously.

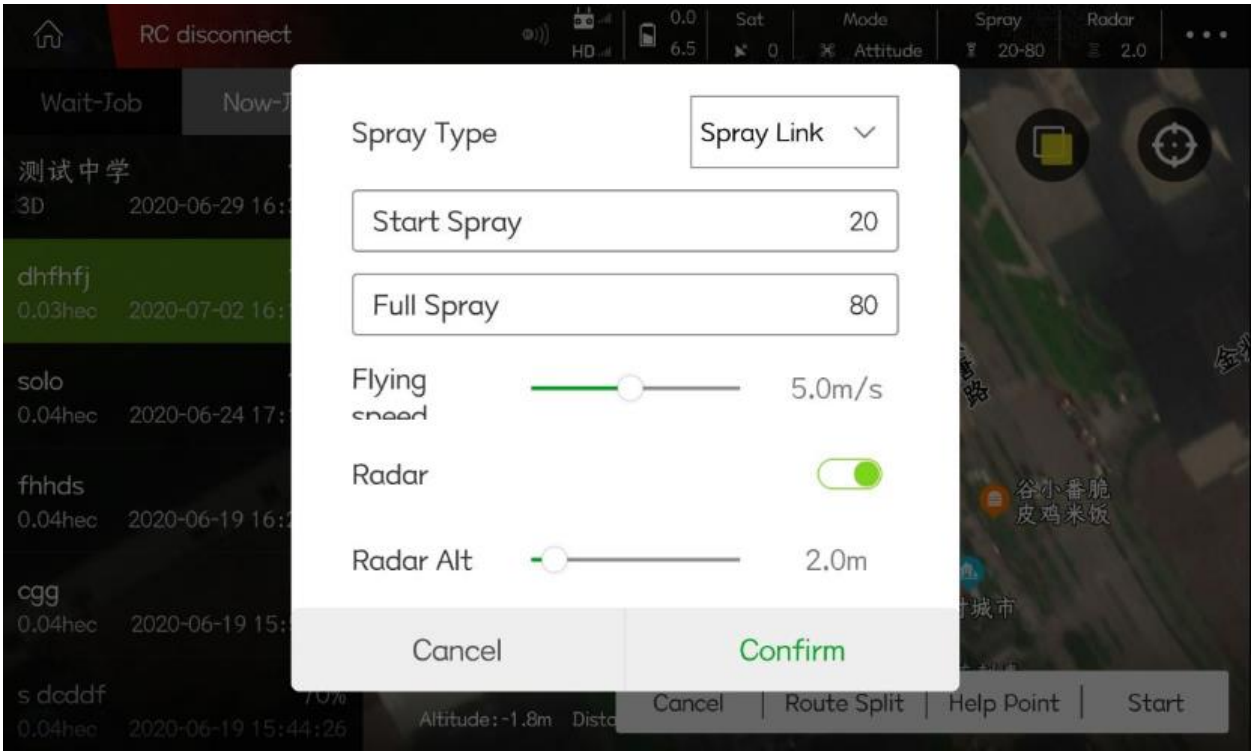
17.Water pump linkage control function

K ++ V2 supports the pump linkage control function, that is, when the pump is turned on, the flow rate of the pump corresponds to the horizontal flight speed of the aircraft. The faster the speed, the greater the flow.

Attitude mode and GPS mode Click “Spray” in the upper right corner of the APP to select the spray mode as linkage, set the spray opening and full spray opening, and turn on the water pump switch when the hand is flying to achieve the pump linkage control.



Operation mode (AB operation, route operation) In the parameter setting interface, set the spray mode to linkage, and the flight control will automatically perform pump linkage control during operation.

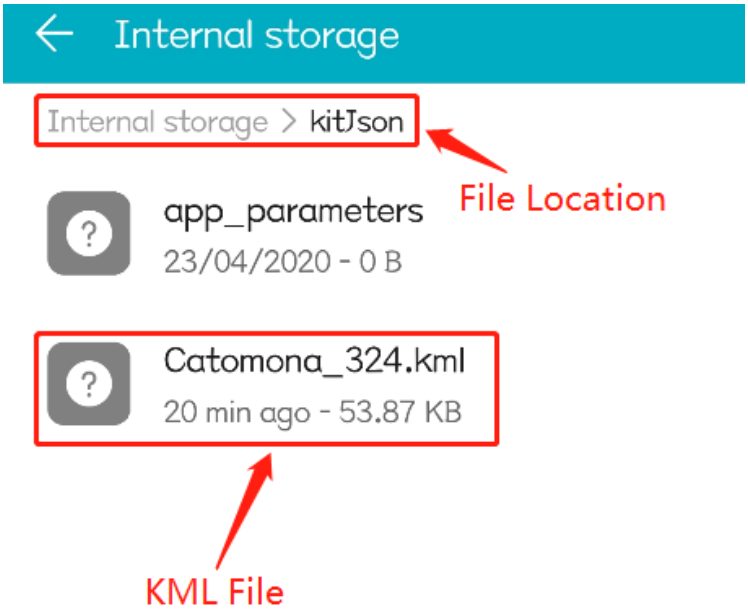


KML File Import

1. First place the created KML file in the “mobile phone internal storage-kitJson” folder.

Note:

1) Only one KML file can be placed in the kitJson folder.
2) A KML file can contain multiple plots.
3) The height in the KML file must use the absolute height (altitude).
4) To use 3D flight routes, RTK equipment must be used.



Appendix 1: LED Tri-color Light Indication Status

LED tri-color light indicates status

Flight Mode Representation	Light State Indication	Priority Level
Attitude (Stability Enhancement, Altitude Setting)	Green Single Flash	Low
GPS Mode (Angle, Speed)	Green Double Flash	Low
Function Mode (Circle, Cruise, Agriculture, etc.)	Green Three Flashes	Low
Intelligent Direction On	Green Four Flashes	Low
Self Driving Mode (Ground Station Control, Return)	Green Flash Mobs	Middle
GPS Representation	**Light State Indication**	**Priority Level**
GPS not connected / GPS not receiving satellite	Red Three Flashes	Low
Poor GPS signal	Red Double Flash	Low
General GPS signal	Red Single Flash	Low
The GPS signal is very good	Red No Flash	Low
RTK Positioning	Yellow Single Flash	
Low Voltage Alarm Indication	**Light State Indication**	**Priority Level**
First level alarm	Yellow Three Flashes	Low
Secondary alarm	Yellow Flash Mobs	Height
Two Side Magnetic Calibration Indication	**Light State Indication**	**Priority Level**
Level Calibration	The yellow light is always on	Middle
Vertical Calibration	The Green light is always on	Middle
Calibration failed	The red light is always on	Middle
Calibration successful	Red Green Yellow Alternate Flashing	Middle
Accelerometer Calibration Representation	**Light State Indication**	**Priority Level**
Calibrating	Red Green Yellow Alternate Flashing	Middle
Calibration Complete	The green light is always on	Middle
Abnormal State Representation	**Light State Indication**	**Priority Level**
Remote control out of control	Red Flash Mobs	Height
Magnetic compass interference / abnormality	Yellow Green Alternate Flashing	Height
GPS satellite lost / abnormal	Red Green Alternate Flashing	Height
IMU vibration is too large / abnormal	Red Yellow Alternate Flashing	Height
Other State Representation	**Light State Indication**	**Priority Level**
Power on initialization	Red Green Yellow Alternate Flashing	Height
Unlock representation	Red Green Yellow Alternate Flashing	Height
Unlock failed	The red light is always on	Height

Appendix 2: Polewing Technical Support

Technical Support

If you encounter problems that cannot be solved during use, you can consult Polewing Technical Support. Relevant technical information, please go to the official download section of Jiyi official website to download.

Jiyi Official Website: www.jiyiuav.com

Jiyi WeChat Public Account: jiyiuav1